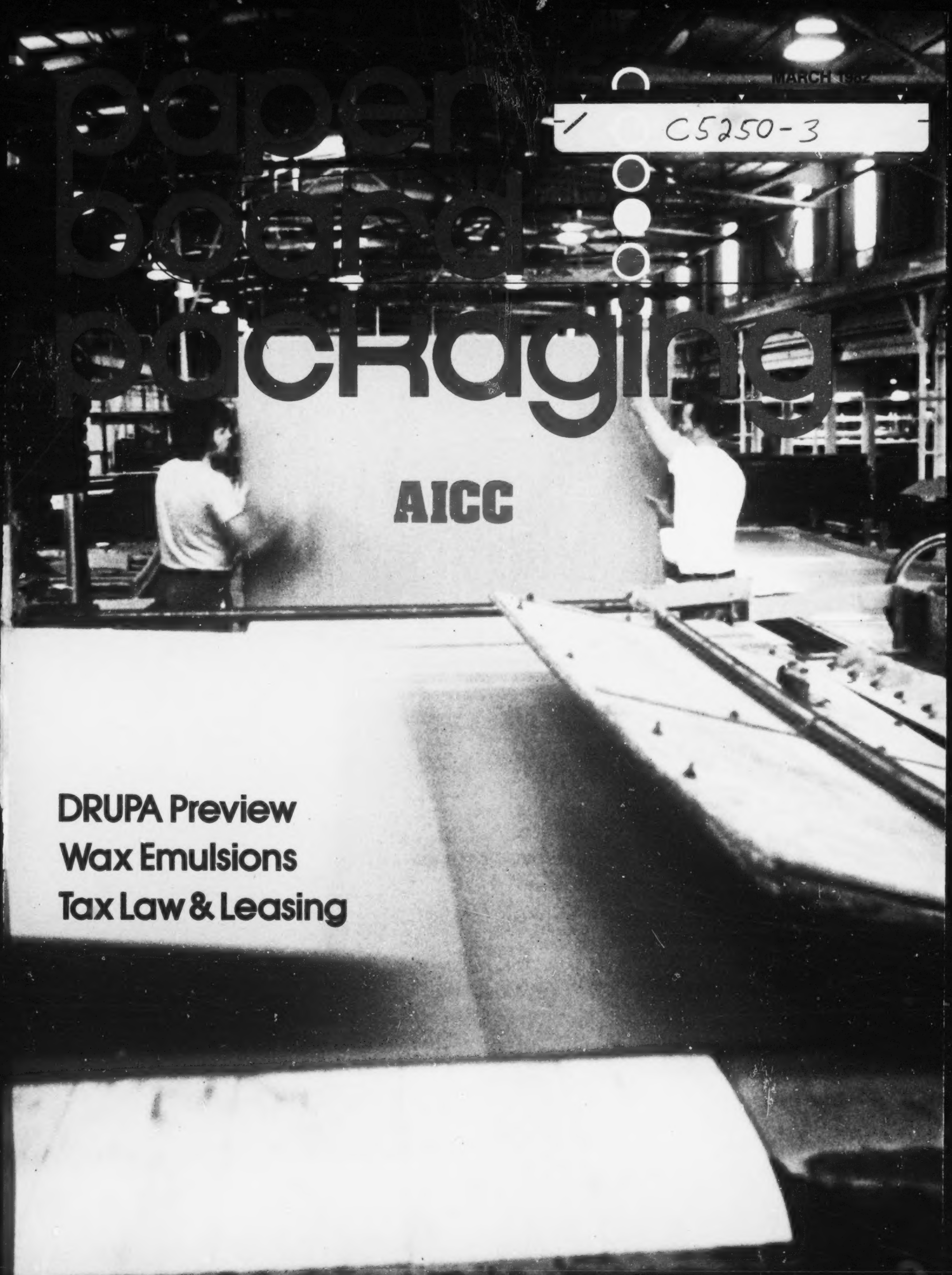
MARCH 1982

/ C5250-3

paper
board
packaging



AICC

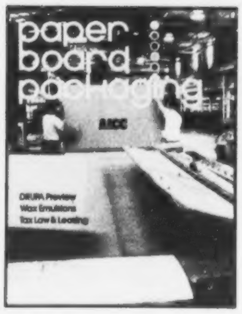
DRUPA Preview

Wax Emulsions

Tax Law & Leasing

vol 67 no. 3

March 1982



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Corrugated sheets are prepared for further converting processes at a St. Regis facility. Cover photo courtesy of St. Regis.

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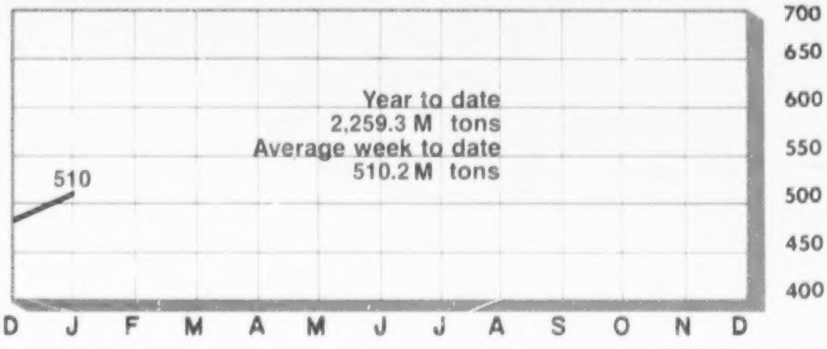
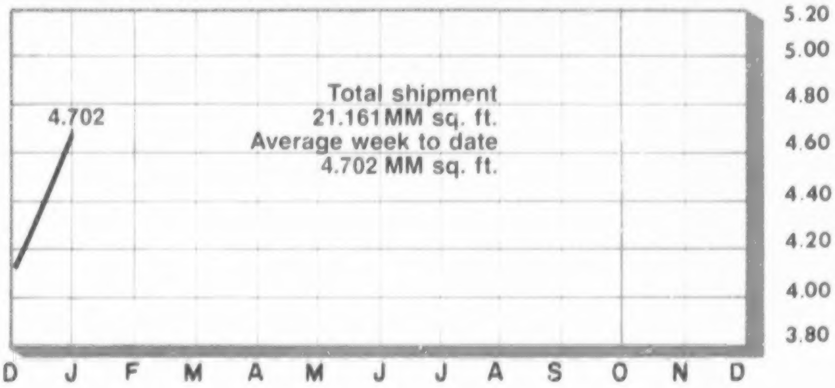
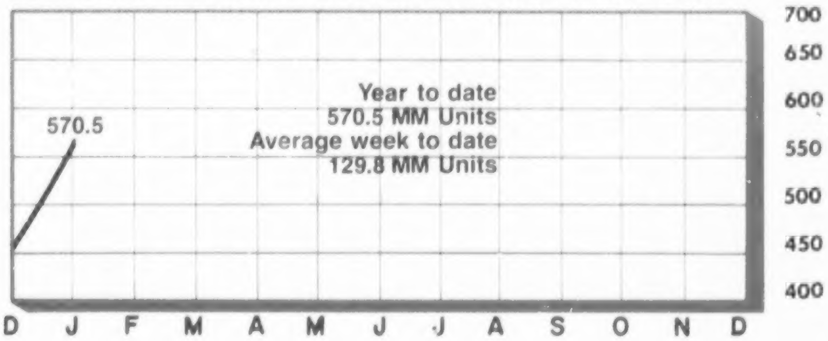


FIBRE BOX SHIPMENTS 1982 • WEEKLY AVERAGE Billion Sq. Ft.



COMPOSITE CAN OUTPUT 1982 • WEEKLY AVERAGE Million Units



RIGID PAPER BOXES: Set-up box billings, about 5% up from the level of early 1981, reflect an increase in sale price rather than in volume. The tonnage of rigid boxes (not reported by the National Paperbox & Packaging Association) generally parallels that entering folding cartons, whose expansion has not been only minimal but minus. This, again, is attributed to recession in some major industries, such as automotive, many of whose accessories are small-box packaged—and also to a decline in consumer retail purchase of luxury or expendable items similarly packaged.

PAPERBOARD MILL OPERATIONS: The first month of 1982 continued to reflect the sharply recessive trends that began in fourth-quarter of '81. January volume of 2259.3 M tons, down some 8% from the previous year, was in fact almost identical with that month of 1972, and little greater than any first-month since. This is in part because of extended Holiday period mill shutdowns, to reduce the excessive on-hand inventories, and a significant number of the industry's fourdriniers are still idled. The low demand for converted products gives small basis for an early upturn.

PAPERBOARD-TYPE PRODUCTION: January's output included 1672 M tons of containerboards and 587M of boxboards (both down 8.4%), as projected on historic basis from the American Paper Institute's "production by furnish" tonnages. This decline in boxboard volume is chiefly for the recycled grades, with bleached boards only 3.5% down. The trend evidently is toward improved package appearance, as purchaser cash becomes tighter, and brands proliferate. However, with fiber box volume 3% down from the '81 month, and exports dismally off, containerboard future must depend on a general business revival.

Circle no. 213 for information on Rockwell ad ▶

APRIL 1982

paper board packaging

1 3

FEFCO
NADD

Darda Demon Corkscrew Loops
A seven loop barrel roll circuit with Darda Demon, self propelled metal racer.
12
Darda Demons
JUMP-STARTING INSTRUCTIONS
PROCTOR-SILEX
beverage brewer
Great for coffee, tea, soups and other hot drinks
2 to 10 cup automatic drip coffeemaker with Brew for Two coffee saving feature

6-Color Flexo Press

PPC Competition

Diecutting Counter Plates

BEST AVAILABLE COPY

vol 67 no. 4

April 1982

on the cover

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Compiled and edited by Jim Lucy, Assistant Editor

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STATE OF ART REPORT

Packaging Innovation Through Packaging Technology 60

This article, the first of two parts, explores what has been, what is and what may be in the future of folding carton manufacturing.

by Walter Stern

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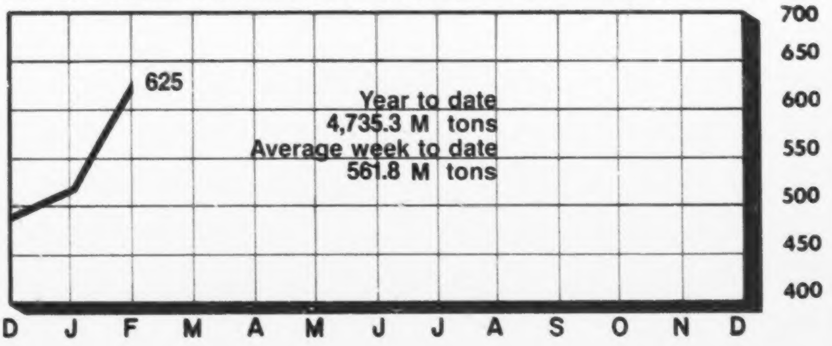

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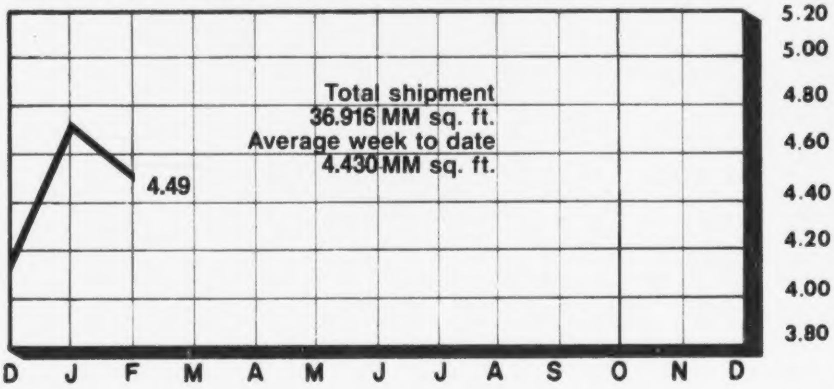

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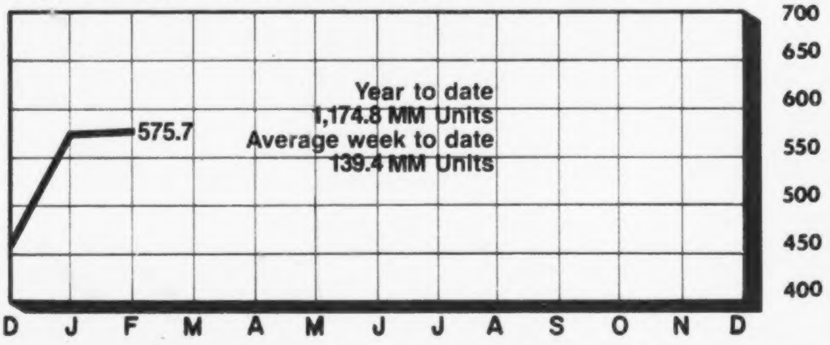

PAPERBOARD MILL OPERATIONS:

Through two months of 1982, paperboard production was down 4% from '81, though the decline was easing, and volume was 16% above a decade ago. Average-week tonnage in the February month was 1.3% up from 1981 — which had been 5.6% down from 1980 — as mills returned to action after extended shutdowns for reduction of excess inventory. The improvement, however, is limited to containerboard grades, while the boxboard output has not responded to an upturn trend. Their tonnage to-date is below that of 1972.

PAPERBOARD-TYPE PRODUCTION:

In February, 2499.9 M tons of board included a projected 1883.6 M of containerboard types, up 2.8% from '81, and 616.3 M tons of boxboards, down 3%. The unfortunate long-term trend for some packagings is seen in the volume to-date, relative to that of same-time 1972 — with containerboard tonnage up 25%, but boxboard volume actually 4% below that of ten years ago. This relative vigor in containerboards is more reflective of modest export demand than of domestic boxmaking, since corrugated conversion remains below the early-1981 level.

RIGID PAPER BOXES:

Set-up box billings (total reported sales) in early 1982 are up some 4% from '81, and by 50% in the ten years since 1972, as reported by the National Paperbox & Packaging Assn. This suggests a distinct decline in the tonnage of recent years, since in the parallel case of folding cartons, price per unit ton has gone up around 8% per year over that period. This would seem to substantiate the decade-long decline in boxboard output, as noted above. As usual, geography is a strong influence, with sales improvements well into the double digits for some industrial areas, and similar degrees of drop in others.

← Circle no. 207 for information on Langston ad

Circle no. 216 for information on Capital Converting ad →

C5250-3 6/5/82

paper board packaging

DRUPA Guide

INSTITUTIONAL PACK
☐ KEEP FROZEN
☐ KEEP REFRIGERATED
NET WGT. 10 LBS.
UP
CORROSIVE
KEEP REFRIGERATED
PERISHABLE MEATS

Corrugated Coatings

Hall of Fame Winner

vol 67 no. 5
May, 1982

on the cover

This month's cover graphically portrays the variety of colors available to corrugated converters through coatings manufactured by Michelman Chemicals, Inc.

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By S. Ray Miller

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An agressive investment policy is just one of the reasons for production increases at Cor-Box, Inc., an independent box plant in York, Pa.

By Jim Lucy, Assistant Editor

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Company has been able to take a lot of work off its 50" flexo and run it faster on small machine.

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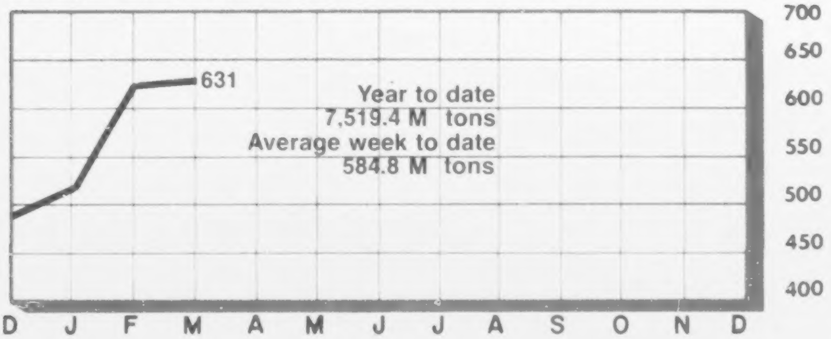

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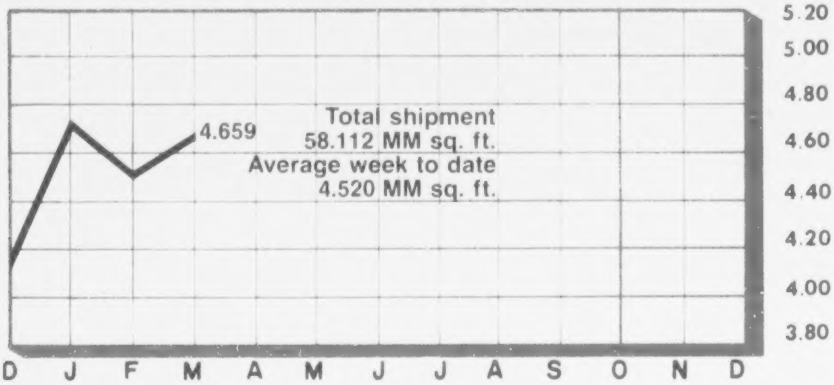

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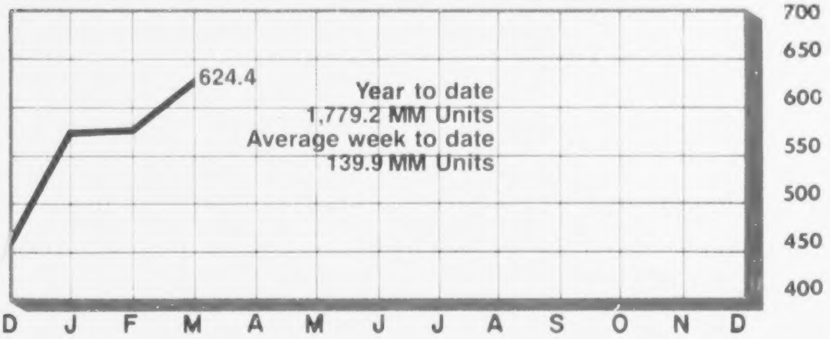

PAPERBOARD-TYPE PRODUCTION

In March, the total tonnage of board output included 2126.6M of containerboards, up 1.8% from 1981 and by 41% in the decade, plus 669.4M tons of boxboard grades, 11.2% down from last year, and actually 9% below the tonnage of 1972. These reversals probably reflect a permanent evolution in the solid-board packagings. The converted products of boxboard grades are under successful attack by alternates, with "noplace else to go." But our containerboards are the least costly in the world — anywhere in the world — and thus the demand is sustained.

PAPERBOARD MILL OPERATIONS:

At first-quarter end, 1982's average weekly output was 4.7% below same-period 1981 tonnage, compared with a drop of 0.8% in '81 from '80, and a rise of 3% in '80 over '79, and of 5.7% in '79 over '78. In March, 2796.0M tons of production was 1.6% below last year, which had been the second-highest calendar month of all time. It is to be noted that containerboard grades currently comprise 76% of total tonnage, compared with 66% a decade ago. This delineates the ghastly collapse of the demand for solid-board packagings — since fiber boxes are 6.7% down.

RIGID PAPER BOXES:

Through the first 1982 quarter, set-up box business continued to show a marked reversal from these previous severe winters, for those regions most affected in terms of transport and retail shopping difficulty. National billings are up some 5%. But the extremes, from double-digit rises in the industrial East to similar drops in the deeply recessed Midwest, are at an all-time-high variance. This again illustrates the vulnerability of the boxboard packaging products to economy gyrations and to competition from alternate materials — and the latter will not disappear with the upturn.

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JUNE 1982

paper board packaging

Mid-Year Review

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Tuesday
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The economy and how it has affected our industry
Tuesday, June 1

Rotary Die Cutter/Stripper

vol 67, no. 6
June, 1982

paper board packaging
Mid-Year Review

on the cover

The country's current economic situation and its effect on our industry is examined in this Mid-Year Review issue. Cover photograph by Chuck Fishbein. Calligraphy by Mary Joe Brown.

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BOX PLANT HISTORY

Box plant carries on family tradition 67

Eva Seitz, who built a box plant up with her experience in rigid sales in New York during the Depression, passed away last June. Sebro Packaging Corp., the company she and her family developed flourishes by specializing in short-run orders.

by Jim Lucy

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Corrugated Bulk Bins Can Slash Labor Costs 69

Ultra capacity bulk bins have been designed to reduce labor and shipping costs.

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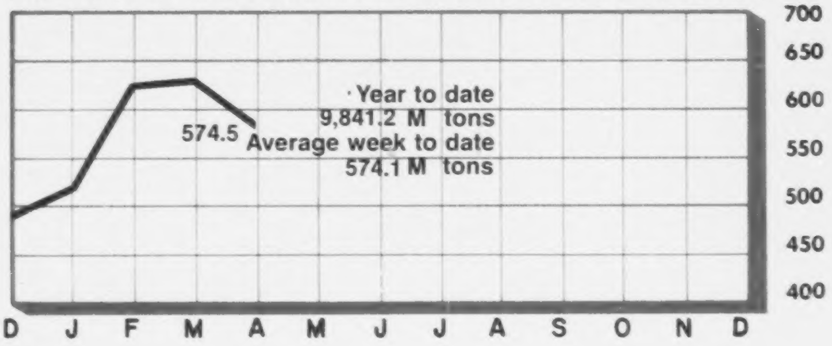
INDUSTRY
STATISTICS

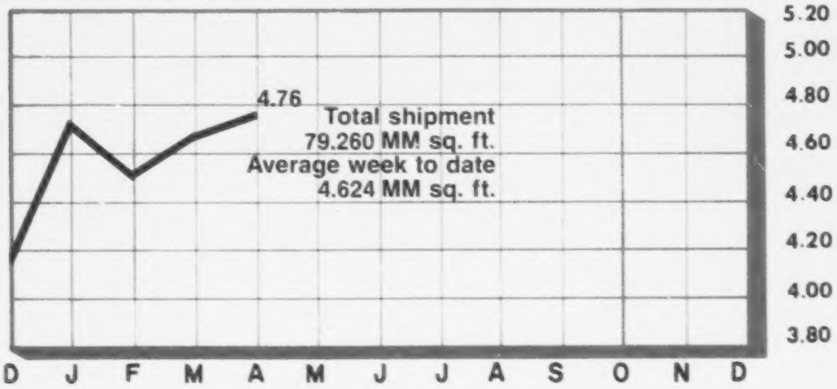
PAPERBOARD PRODUCTION 1982 -WEEKLY AVERAGE 1,000 Tons



PAPERBOARD-TYPE PRODUCTION:

In April, 2462.3 M tons of board output made 1783.0 M of containerboard types — down 11% from last year and up only 8% from ten years ago — plus 679.3 M of boxboards, 5% below the '81 volume and 5.4% down from the 1972 month. This illustrates the effect, upon the "carton" boards, not only of current economic stress but of long-term inroads by alternate packaging forms and materials. Fiber container boards, by contrast, are also vulnerable to present stresses, but have no long-term competitors for packaging use.

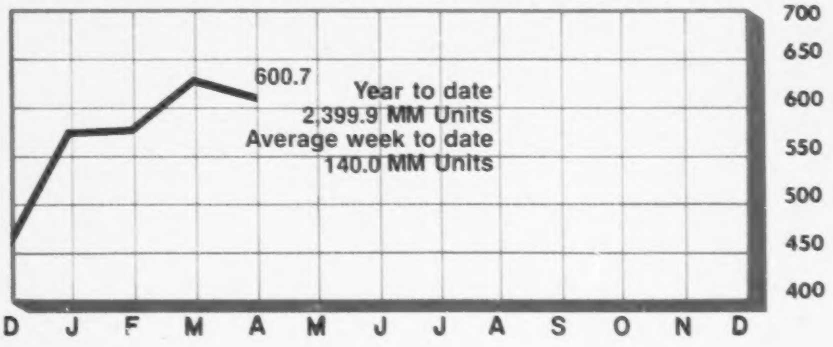
FIBRE BOX SHIPMENTS 1982 -WEEKLY AVERAGE Billion Sq. Ft.



RIGID PAPER BOXES:

Through the first four months of 1982 "set-up" box total billings were about even with last year — which had been up 10% from '80 — for major box producers reporting to their National Paperbox & Packaging Association. The usual great variations appear, with monthly extremes ranging from plus 96% in one locality to minus 68% in another. Generally, orders continue to lag in the mid-country areas, beset by automotive and construction stagnation, while flourishing in metropolitan sectors elsewhere. As in other areas, the rise in business does not compensate for inflation.

COMPOSITE CAN OUTPUT 1982-WEEKLY AVERAGE Million Units



PAPERBOARD MILL OPERATIONS:

The year's first third ended with an average-week production 7.1% below 1981, a continuing paralysis that began in last year's final quarter. In these seven recessive months, total tonnage has been down 8.8% from the previous year, with a drop of 7.3% in containerboard grades and of 11.3% in boxboards, according to American Paper Institute "production by furnish" data. During the April month, containerboard-furnish tonnage was down 11.1% from '81, and boxboards 5%, for a 9.5% total drop. No sign appears of changing conditions that might lead to an upturn.

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Mid-Year Review

How is the recession influencing the health of our industry? Does the future look any brighter? A number of extremely knowledgeable people with direct industry ties take a look.

Headlines about the economy these days are not very encouraging. The unemployment rate is over nine percent. Corporate profits in the United States fell 17.5 percent in the first quarter of this year, almost a record, according to the Commerce Department.

The gross national product (GNP), after adjustment for inflation, fell at an annual rate of 4.3 percent in the first quarter. April saw a 6.4 percent decline in housing starts. The picture is not rosy.

Economists have been saying that the economy would experience an upturn by now. It is simply not the case. According to Allen Sinai, an economist with Data Resources Inc., the declines are "a sign that the U.S. economy, since 1980, has gone through an unprecedented business cycle downturn for the post-World War II period."

Last month top executives of the nation's major corporations met and were generally pessimistic about the economy and uncertain about what the future holds. However, many of these same executives said they still supported the President's policies over all.

This is not to say that all the news out there is bad. There has been a sharp decline in the rate of inflation. Also, retail sales rose 1.4 percent in April on gains in durable goods.

"Untypically, we've been unusually busy," says a Midwestern executive/owner of a box converting operation. "We've added a shift and are working overtime because of the highly specialized area (preprinted linerboard) we deal with.

High interest rates

"People are upgrading their packaging in order to keep up with the market. I'm not terrified about the economy. I'm concerned about high unemployment and the fact that nobody will be able to buy things packaged in stores like K-Mart. I'm glad to hear retail sales are up. What's greatly distressing is high interest rates. It's hard on a young company that wants to grow. We keep planning for when times will be good."

"The situation is very, very critical," notes the chairman of the board of a medium size independent converting plant. "Look at the home. Almost 100 percent of the items in it are packaged in corrugated. I've never seen interest rates go up and down like a yo-yo in all my years. They are killing the country, crippling it."

On July 1 there is a scheduled 10 percent cut in U.S. personal income taxes. Will those extra dollars in the consumer's pocket start him (or her) on the way to buying packaged goods and give this industry a shot in the arm? Only time will tell.

What follows is a revealing look at the industry as seen by people who have a firm grasp on it's pulse.

Improvement Has A Long Road To Travel

By Fred Sharring, Editor
Official Board Markets
The Prices of Paperboard

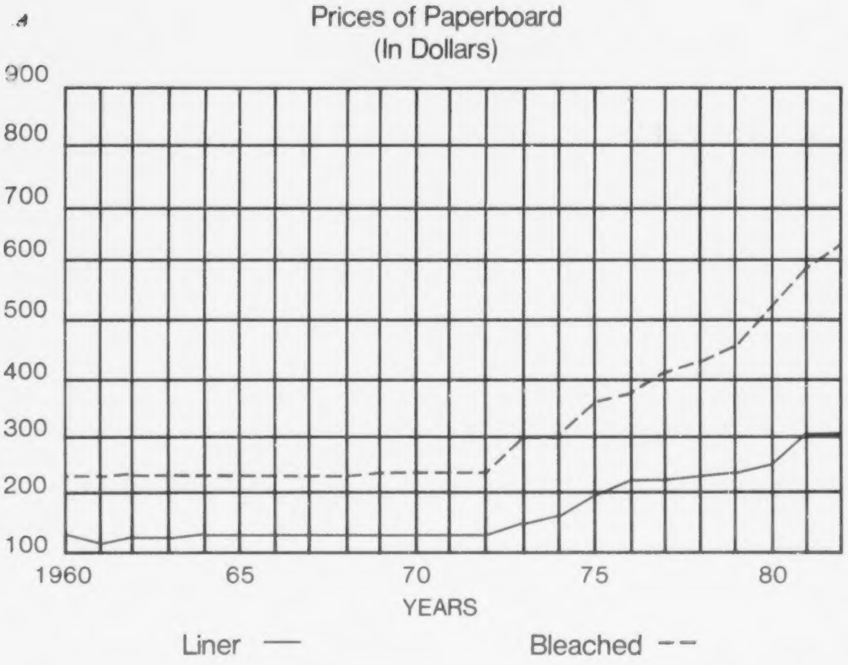
One of the most painful present squeezes on the packaging industry is the escalating cost of producing paperboard, plus the persistent difficulty of selling its converted products at a profit.

Questions frequently asked of our associated *Official Board Markets* newsletter concern historic trends in prices of basic boards, and of the reclaimed fiber materials used in paperboard manufacture.

The accompanying charts will give some insight into 20 years of fluctuations, at mid-year point, for standard 42-lb. kraft test linerboard, 15-point bleached kraft boxboard, new double-lined kraft clippings (corrugated converting scrap), and reclaimed newspapers. Prices are the going rate, per short ton, in the representative Midwest market region.

This span covers some illustrative years before, and since, the 1973 OPEC petroleum embargo, and this following decade of soaring energy costs.

It may be seen that the linerboard price was no higher in 1972 than in 1960, but in the past 10 expensive years it has gone up 126%. Bleached board price was only 7% higher in '72 than in '60, but since then has risen by 160%. In fact, our records show that there were only four changes in the announced list price for 42-lb. linerboard during the 16 years between 1956 and 1972—but 17 changes over the 10 years since.



Prices for paper fiber reclaimed for recycling are another and sad story. The value of high-grade corrugated plant residues — a prime source of first-rate secondary kraft — is actually below that in 1960, despite a number of wild ups and downs in the 22 years. Reclaimed newspapers, a high-volume commodity used in formulating many boxboards — as well as in recycled newsprint currently selling at some $500 per ton — are priced lower than they were 14 years ago. So much for our strenuous and well-publicized campaigns toward resource recovery.

Not Growth, But Survival...

"First and foremost, we are managing the company not for growth, not for expansion, but for survival . . . When we might expect the economy to recover is a complete mystery to me, and I suspect to everyone else as well."

So said the chief executive of one of North America's largest forest-products firms, with annual sales well above $2 billion, in telling shareholders of its 1982 first quarterly loss in history — net profits down 190% from '81, which in turn had been 75% below 1980.

His remarks are not an exception, but a summary of this protracted worldwide crunch. Other leaders have recorded: "Frankly, we don't see any sign of recovery, and expect this to be a very difficult year," and "The current economic scene is awful, and we don't know when it will improve."

Improvement, if it comes, will have a long, far road to travel — so long that a legitimate question arises as to whether a sufficient improvement is possible at all. In a recent reporting period, the nation's 14 top forest-products firms all had reductions, aggregating 58%, in after-tax profits below the previous year. Indeed, nine of them had profits well below those of five years ago, and five firms were down from ten years ago.

Even this appalling record was come to only by dint of frenzied scurrying about for extraordinary credits. These include exchange of stock for debt, sale of timberlands, divisions, subsidiaries, and leaseholds, tax-deductible gifts of marginal properties, reevaluation of assets, changes in accounting methods, and the like — most of which are devices that cannot be repeated in future efforts to rescue the balance sheet.

So, an uneasy feeling begins to grow that this deluge of social and economic upheaval is something deeper and different from just another brief dip in the pattern of traditional peaks-and-valleys. One industry leader has expressed it: "There is a growing concern that what is happening . . . is considerably more serious than the normal cyclical downturn of the type that we have previously experienced. There is a risk that deep-seated long-term structural changes are taking place as a result of changes in lifestyle and economic policies..."

There seems valid reason for believing him — that we have reached and passed a peak of national affluence and expansion that can never be regained by any set of expedients. The abundant resources are simply no longer available. The danger, then, is that instead of accepting and programming for the modified lifestyle, we will shatter our energies in trying vainly to reconstruct the old.

Much is made, for an example, of the prospect that "when interest rates come down" the choking construction industry will resume its traditional fervor, and the building-materials market with it. But sober analysts point out that even at a zero interest rate, the inherent cost of what we have come to consider the average home is no longer accessible to the average wage-earner. He must settle for minimal housing, on a smaller lot, or for multiple-dwelling quarters — and the building-materials producers will have to share that minimization. Their plans must include adaption to a lower level of permanent business.

That appears to apply also in their paperboard packaging sector, now showing signs of long-term attrition. Although shipping-container production continues to increase with population demand, the "small box" sector is fading, relatively.

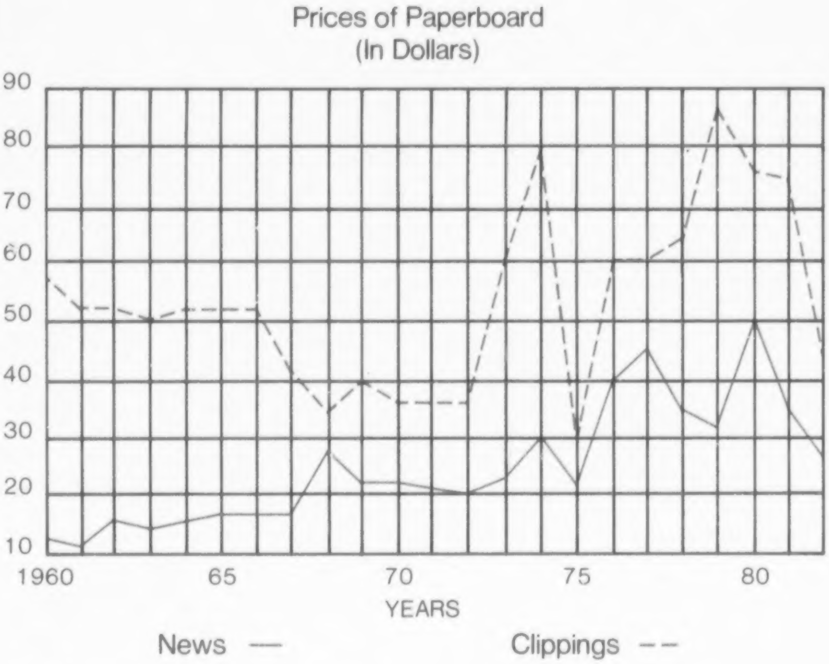
Over the past 20 years, along with a 24% population increase, folding carton shipped tonnage is up only 14%, and that of rigid paper set-up boxes is actually down 50%. These markets are being lost to alternate materials — such as the plastics — and to newer package forms — such as shrink- and blister-packs.

In the face of this, the old established industry associations have been retreating, rather than innovating. In earlier years, these groups represented an expanding, activist, joint-effort business climate that sponsored many of today's most contributive developments, and announced its progress at large. But now, for an example, one of the most senior associations has reduced its service activities, and limits its progress announcements to a diminished membership, with publication forbidden.

Another such group, once the most populous and progressive of all, has been erased down to a two-man staff plus secretaries, and has cancelled all conferences, though the annual value of its members' output is now above $10 billion — up 450% in 20 years — produced by nearly 900 separate companies in more than 1500 plants, consuming more conversion material than any other single paper end-use.

This turn-away from group-effort philosophy by the many has, to some extent, been taken up by the relative few. In the fiber box area, for example, an organization of independent converters is meeting and expanding actively. In the folding carton field, membership is now open to a group that had previously been

Mid-Year Review



representing set-up boxmakers alone. In the supplier sector, such groups as the cutting-die manufacturers have formed separate associations, and are supporting them strongly. It must remain to be seen what effect this will have on the revival of cooperative development, at this stage of economic evolution when that climate is more vital than ever.

Another portentous reversal of earlier outlook is the widespread divestiture of product areas that were eagerly sought and acquired in the diversification flurry of 20 years ago — and for some years before and since.

In one present case, a prominent integrated producer is abruptly selling off all paperboard packaging elements, including mills, in favor of taking up service and distribution operations. Other majors have sold long-held stables of corrugated plants or carton facilities, and will concentrate on board production, or some other specialty. Several have eliminated all composite can/tube operations, by sale or closure. Many have converted paperboard machines to making newsprint, as a more profitable product. Some have abandoned the conversion of their own corrugated, and sell only the sheets. But very few are investing in new packaging-area capacity. On the contrary, closing of marginal plants is the order of the day.

All of which may be well-advised adjustment by long-sighted businessmen—a change-of-mind after giving it a good try. But these evolutions can only have profound effects on the make-up of the industry, and if this shift should also turn out to have less-than-happy results, then —if together with an expectation of return to business at its former level when an upturn comes—the combined consequences could be disastrous. Because then a recession in one area leaves the producer without the surviving profitable business areas—which were the reason for that diversification in the first place.

This is not to say that this industry has imposed a static status on itself, or has accepted one imposed upon it. Many forward-looking and successful efforts are going forth in such essentials as forest yield, improved utilization, process refinement, and energy conservation. But these are properly directed toward higher efficiencies and more-serviceable products, rather than to the traditional speculative competition for a supposedly expanding supply of customer dollars.

Those dollars will now be going for an increasingly costly supply of essentials, with the remaining "discretionary" income a diminishing target, beyond anything the packagers, or the governments, or anyone else can do about it. The old days of unlimited national wine and roses are over. Industry efforts to take full advantage of economic upturn will be more fruitful if that is recognized in advance.

Take Stock Of Your Company's Strengths

by J. Richard Troll Executive Director AICC

When I was asked to write my opinions concerning the corrugated industry at mid-year my first reaction was to decline, as I'm no longer directly involved in the manufacturing and marketing of corrugated products. On second thought, as Executive Director of the AICC I do talk each day with several converters all over the country. I also in recent weeks have spoken to members from Canada and Europe. Invariably, all discussions ultimately wind up with references to business conditions. In this process I have observed several interesting factors which you may find helpful.

First of all, what we are experiencing is happening all over the world. Business conditions in Canada, England, France, Switzerland, and Germany all reflect sizeable decreases over last year. In the United States, until mid-March, there were a few pockets of prosperity, primarily in the Southeast, Southwest, and West Coast markets. From my observations, by the end of March these were gone and things were pretty slow all

Wax Production on the Upswing

This paper was presented at a National Petroleum Refiners Association meeting.

by David A. Rosow
President
Moore & Munger, Inc.

The author estimates that as much as 300-400,000 lbs of new wax supply will become available within the next two years.

An analysis of the supply and demand segments of the finished wax market in the U.S. has been undertaken to update a similar 1979 Moore & Munger study. This current study was restricted to finished waxes, since they represent the largest sales volume in barrels and dollars and are the most costly products to produce.

Since 1979 U.S. production has remained level, exports have continued to decrease, imports are increasing and consumption has faltered due to both erratic supplies and economic conditions.

An additional 200-300 million pounds per year of new refined wax will soon be available from U.S. and foreign producers. Some of this is already on stream; however, the continuing decline in average melting points means that wax consumers will need technical support in order to reformulate products around the grades that will be available. Moore & Munger continues to forecast that wax consumers can absorb 30-60 million pounds of additional product each year.

While wax has not escaped entirely from the effect of the current recession, it has done considerably better than most other petroleum products and with few exceptions continues to be healthy and vibrant. During the past 15 years, many have questioned the long-term demand for waxes and have forecast its certain demise. The wax industry has survived, withstanding ten years of sometimes severe allocations and, of course, rapidly rising prices.

In a paper presented to NPRA recently, Moore & Munger stated that, under the prevailing trends, fully refined wax demand would soon exceed supply. Our forecast was for a potential of some 30-60 million pounds per year of new demand — but only if reliable supplies were to become available. We said then that if wax continued in short supply and subject to allocation, wax consumers would be reluctant to increase their usage and spend R&D time and money for new applications.

Within this last thirty-month period, seven refiners announced a variety of wax plant projects which we estimate will result in 150 million pounds of new fully refined paraffin (FRP) capacity. This enthusiastic response to the needs of the wax consuming industry supports the prognosis for long-term growth.

Before looking at these new supply sources, let's review the U.S. wax market.

Prior to 1979 most of the available data on wax was confusing and of generally poor quality. In our paper, we attempted to reassemble it in a meaningful form and reached the following conclusions:

- During the period 1972 to 1979, the total amount of all waxes produced each year in the U.S. hovered around 2 billion pounds.
- U.S. production of "finished" or "refined" waxes (fully refined, scale and microcrystalline waxes) averaged some 1.3 billion pounds per year for the 1972-1979 period.
- U.S. exports of wax were declining.
- Imports of wax were small but increasing gradually. Despite product shortfall, U.S. price control of crude oil kept out foreign supplies of wax, (Table 1).

In the two years following that paper, several changes occured:

- The available data has improved. Definitions have been aligned, and industry reporting is more accurate.
- Capacity of U.S. refiners for FRP, scale and microcrystalline waxes is increasing gradually, (Table 2).
- Domestic demand has remained basically flat, which can be attributed to restricted supplies, although recessions resulted in slight declines in 1980 and 1981.
- Wax production outside the U.S. has expanded at a rapid pace.
- Since our 1979 paper, about 150 million pounds of new production has either come on stream or been announced by North American refiners.

U.S. demand for fully refined, scale

Wax Production

and microcrystalline waxes has been constrained by supply. Approximately 1.5 billion pounds per year of these waxes were used in 1978 and in 1979. Consumption in 1980 declined to just over 1.4 billion pounds, as supplies were severely limited by refinery problems and high off-shore prices. In 1981 wax consumption decreased further to 1.3 billion pounds. That wax demand did not fall further is a remarkable achievement, considering the fluctuating economy, a significant freeze in the South affecting waxed corrugated box sales, and the baseball strike, which hurt the cup industry.

In 1981 refined wax demand remained firm until late in the fourth quarter. DOE's data shows that U.S. refiners were producing wax at an accelerated pace in 1981 — 1.944 billion pounds compared with 1.78 billion pounds in 1980. Production did slow in November and December, reflecting a fall off in demand due to a poor economy.

Economic indicator

We have seen an improvement in wax consumption during the first quarter of 1982. Wax demand tends to be a leading indicator in signaling the end of recessions, because it is a difficult product to store and goes mainly into the packaging industry. In fact, at the end of the 1975 recession, when lube oil production was still demand-limited, wax was placed on allocation during the first phase of the recovery. Unfortunately, we will not know for some time if a true end to the current recession has yet been achieved.

As mentioned earlier, some of these new supplies are available now. In 1981 Quaker State converted their Emlenton, Pa. facility from a complete refinery into a wax plant. The largest announced new production is the Shreveport, La. plant of Pennzoil. Other refiners are in the process of debottle-necking, repiping, rebuilding and expanding capacity. Specific details of these increases have not been publicly announced and, therefore, cannot be discussed here.

> *Wax demand tends to be a leading indicator in signaling the end of recessions, because it is a difficult product to store and goes mainly into the packaging industry.*

Imported waxes, too, are beginning to have an impact on the U.S. market, as they can now compete with U.S. production on an economic basis. Prior to 1981, imported waxes were considered a last alternative for U.S. consumers. During recent periods of severe shortfall, however, wax consumers were forced to import waxes, thereby paying a significant premium either to extend their wax supply or just to keep operating. Meanwhile, foreign producers expanded capacity over the past few years in order to take advantage of:

- A worldwide shortage of refined wax which resulted from decreasing exports and increasing demand both in the U.S. and elsewhere, and;
- U.S. decontrol of crude oil, which now allows foreign producers to compete with U.S. suppliers.

It is possible to foresee that, within a few years, FRP wax imports (including candles) may amount to 150-200 million pounds per year. These imports, when combined with U.S. production increases, make it appear that a total of approximately 300-400 million pounds per year of additional FRP wax will soon be available.

Can the U.S. wax market absorb these new supplies?

We believe the answer is a qualified yes; but, there are several issues and trends that must be faced.

The solution to the consumers' problem is not simply additional supplies. Improved quality is needed too. Unfortunately, each time a refiner revamps his plant, the overall impact seems to be a lowering of the melt point and a softer wax. This change relates to the basic long-term trend in base lube oil demand; a higher percentage of low viscosity lube oil is being produced today in the U.S. to meet the automobile manufacturers' requirements. Slack waxes from these low viscosity lube oils produce low melting point waxes. In fact, we estimate that the median melt point of all domestically produced FRP wax has dropped by about five degrees in the last 15 years. While this may seem to be a small change, it has had a major detrimental effect on consumers.

A Moore & Munger survey indicates that the area of largest growth potential

TABLE 1
DOMESTIC WAX DEMAND, 1970–1981
Million lbs./Calendar Year

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Production	1,762	1,943	1,721	1,895	1,940	1,586	1,962	1,863	1,949	1,930	1,779	1,944
Exports	506	465	316	270	246	170	175	206	152	234	206	138
Stocks	278	313	297	277	355	241	192	162	213	205	152	188
(Change ±)	−1	+35	−16	−20	+58	−94	−49	−30	+51	−8	−53	+36
Imports	33	26	94	299	268	192	183	-	-	-	-	-
Domestic Demand	1,290	1,470	1,515	1,944	1,904	1,702	2,019	1,687	1,746	1,706	1,626	1,770
Imports (DOC)	34	27	20	106	99	49	51	64	96	89	116	170
Adjusted Domestic Demand (BOM Imports Excluded	1,291	1,470	1,441	1,751	1,735	1,559	1,887	1,751	1,842	1,795*	1,742*	1,940*

Sources: Department of Energy, Office of Energy Data and Interpretation,
Adjusted by Moore & Munger, Inc.

*Moore & Munger believes Micro wax production was inaccurately reported in these years. The data has not been adjusted to revise Micro production.

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Wax Production

is in the higher melting point waxes. For example, the paper cup and container industries use about 250 million pounds of wax in a normal year, primarily 135°F to 145°F melt point. Hot melt adhesive producers prefer even higher melting point waxes and they are projecting substantial increases. The corrugated industry would rather use higher melting point waxes.

Since the new domestic supplies will be predominately in lower melting point and softer waxes, wax consumers probably will have to reformulate products to take advantage of them. This reformulation program will be a major effort and will not occur overnight. The wax producing side of the industry is already being asked to provide technical assistance—much more than in recent years. To get these efforts underway, however, we believe the consumer must be convinced that the new supplies will in fact be readily available for the long term. Customers have been whiplashed in the past by wax allocators who have unwittingly doused many a production schedule and new project with a lot of cold water and not much wax. The wax allocators of the past ten years must now become salesmen—and technical salesmen above all.

The offshore supplies present a different series of problems. Imports of fully refined wax have generally been packaged. Unfortunately, the big consumers prefer waxes in bulk. As everyone is aware, molten refined wax does not store well, and handling bulk tanker shipments can be a difficult experience. A period of time will be necessary before customers can develop confidence in quality and continuity of supply from overseas.

Future outlook

It is risky to predict future wax demand after working in an environment of supply shortages. Many new projects that could use wax were shelved and others were modified to use plastic as a wax substitute. (These plastics include polyethylene, polypropylene and polystyrene, which can be and are used in paper coatings and containers.) The capacity of the plastics industry for these products is exceedingly large, and the economics of those plants dictate that they be run close to capacity. Decontrol of crude oil has been a double-edged sword, and, as a result, the plastics industry lost a large export market. The product formerly sold overseas must now find a home here in the U.S. Plastics salesmen are aggressive and technically oriented and plastics remains a formidable contender, particularly in the packaging industry. But, capacity/economics problems of this industry are causing agonizing reappraisals, and some of the excess capacity is being shut down.

In 1981 wax consumption decreased to 1.3 billion lbs, down one million lbs from 1980. That wax demand did not fall further is a remarkable achievement, considering the fluctuating economy, a significant freeze in the South affecting corrugated box sales, and the baseball strike, which hurt the cup industry.

Imported waxes are beginning to have an impact on the U.S. market because they can compete with U.S. production on an economic basis.

In spite of these large market and production shifts, we stand by our 1979 projections. The U.S. fully refined paraffin wax market can absorb 30-60 million pounds of additional supplies each year for the next several years.

Projected increases in wax availability, if combined with attentive marketing based on service, can prevent the loss of major markets, such as the loss that occurred in the 1960s when the milk carton converted to polyethylene.

In view of these new supplies, Moore & Munger surveyed the major markets to determine their future requirements:

- The packaging industry will continue to be the largest consumer of waxes.
- The U.S. cup industry is forecasting a growth rate of 2-3% per year over the next several years in waxed cups.
- The corrugated industry is expected to grow with the economy.
- Hot melt adhesives are forecast to grow at nearly 10% per year.
- Limited wax supplies and candle imports adversely affected the U.S. candle industry, but it is now poised for a resurgence.

Indeed, it is quite possible that this increasing demand will totally absorb the new supplies—including imports—and that we will be facing a potential shortfall by the mid to late 1980s.

Recent NPRA papers have indicated

Table 2
Wax Production Capacities of U.S. Refineries

TYPE	UNITS	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Fully Refined, Crude Scale, and Micro. Waxes	million lbs./ calendar year	1,618	1,244	1,265	1,234	1,276	1,358	1,348	1,358	1,337	1,410	1,307
Semi-Finished Slack Waxes and Petrolatums	million lbs./ calendar year	1,390	1,193	1,224	1,265	1,224	1,255	1,732	1,638	1,680	1,659	1,690
TOTAL WAXES	million lbs./ calendar year	3,008	2,437	2,489	2,499	2,500	2,613	3,080	2,996	3,017	3,069	2,997

SOURCE: National Petroleum Refiners Association

Wax Production

a somewhat comparable increase in base lube oil demand. If lube oil production expands, more feedstocks should be available for wax plants. However, slack wax is a prime cracker feedstock, and technology is now available that can eliminate slack wax in lube oil refining.

It is risky to predict future wax demand after working in an environment of supply shortages. Many new projects which could use wax were shelved and others modified to use plastic as a wax substitute.

In order for the slack wax to be directed to the finishing plants, all waxes will have to carry their own weight in the refinery.

Of serious concern to all in the lube and wax industry is the average age of the U.S. plants. Lube and wax plants must receive their share of the refiners' capital dollars to upgrade, revamp, debottleneck and even rebuild facilities. The recent announced closing of the Phillips refinery in Kansas and Chevron's rebuilding program in Richmond, Ca. are symptomatic of the potential problems, and two possible solutions.

The U.S. refining industry is in a period of transition and the wax industry will not escape untouched. Wax consumption is not dependent upon the size of crankcases or on the miles-per-gallon dictates of Congress. While utilities can convert to coal, our customers will not convert to plastics, if they can be assured of growing supplies competitively priced. Waxes are used in dozens of industries and hundreds of different types of companies, from crayons to cosmetics to cups. Wax is important to the packaging industry and vital in automobile tires. New supplies of refined wax will be welcomed by consumers and will be absorbed over the next five years as the demand side of the market is finally allowed to grow. Since the decade of allocation is now behind us, a new breed of wax salesmen, who have the proper technical support, must emerge in order for our industry to expand. That is the challenge of our future. ☐

The U.S. fully refined paraffin wax market can absorb 30-60 million lbs of additional supplies each year for the next several years.

Moore and Munger is a privately-owned integrated marketer and producer of petroleum products. The cornerstone of the business is wax and related products, which they have dealt with since 1888.

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paper board packaging

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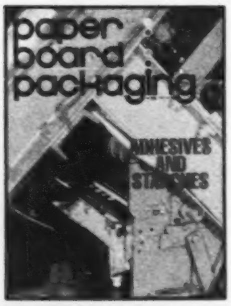
July 1982



on the cover

The latest developments in and uses of adhesives and starches are examined this month in a number of articles starting on page 36. Cover photo courtesy of National Starch and Chemical Corp.

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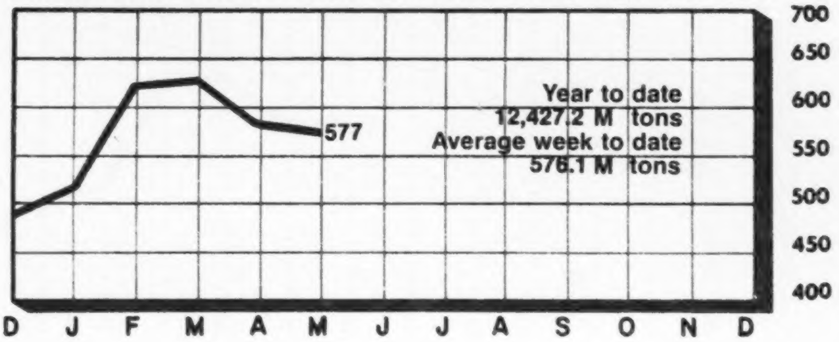
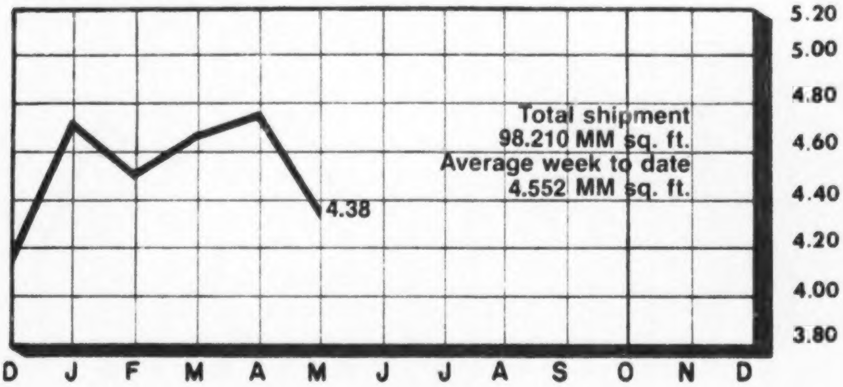
INDUSTRY
STATISTICS

PAPERBOARD PRODUCTION 1982 •WEEKLY AVERAGE 1,000 Tons



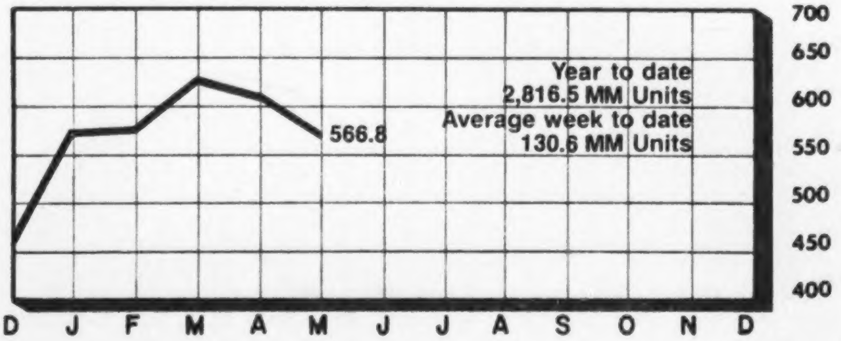
Year to date
12,427.2 M tons
Average week to date
576.1 M tons

FIBRE BOX SHIPMENTS 1982 •WEEKLY AVERAGE Billion Sq. Ft.



Total shipment
98.210 MM sq. ft.
Average week to date
4.552 MM sq. ft.

COMPOSITE CAN OUTPUT 1982 •WEEKLY AVERAGE Million Units



Year to date
2,816.5 MM Units
Average week to date
130.6 MM Units

PAPERBOARD-TYPE PRODUCTION:
In May, 2555.1 M tons of produced paperboard (down 9.5% from the '81 month) produced 1862.4 M of containerboard grades (down 10.3%) and 692.7 M of boxboards (down 7.2%). An unusual development in this May reduction of 327,400 tons from that month of 1981 is that some 213,500—or only 65%—is in containerboards, with the remainder, of course, in boxboards. This is a far cry from the near 3½-to-1 ratio of recent months. This can only reflect the decline in demand for solid-board slip sheets in corrugated shipments. It does not, unfortunately, denote any rise in demand for boxboard products.

PAPERBOARD MILL OPERATIONS:
The 1982 average week saw 577,100 tons produced as of May-end, an 8.5% drop from '81 output. The decline appears now to be at an increasing rate, since in the eight weeks of April/May tonnage has been 10.4% below 1981. Recession has now continued for eight months, since the beginning of the 1981 fourth quarter. In that period of 34 weeks, only five weeks had a production above same-week of the previous year—with no such weeks since mid-February—and the deficiency below previous-year had become 1.4 million short tons, including all classes of packaging paperboards.

RIGID PAPER BOXES:
In the early months of 1982, sales of the "set-up" boxes held up well, in comparison with other packaging forms. An unfortunate April month drop of nearly 21% from 1981 in total billings brought this year's sales to some 8% below '81. At the end of that month, only one of the National Paperbox & Packaging Association's geographical regions remained ahead of business last year—by .4%—with all other sectors recording deficiencies up to 25% down. Even so, the Association has assumed a 4% "absorption factor" acknowledging the transfer of business to the surviving producers, from those forces out.

paper board packaging

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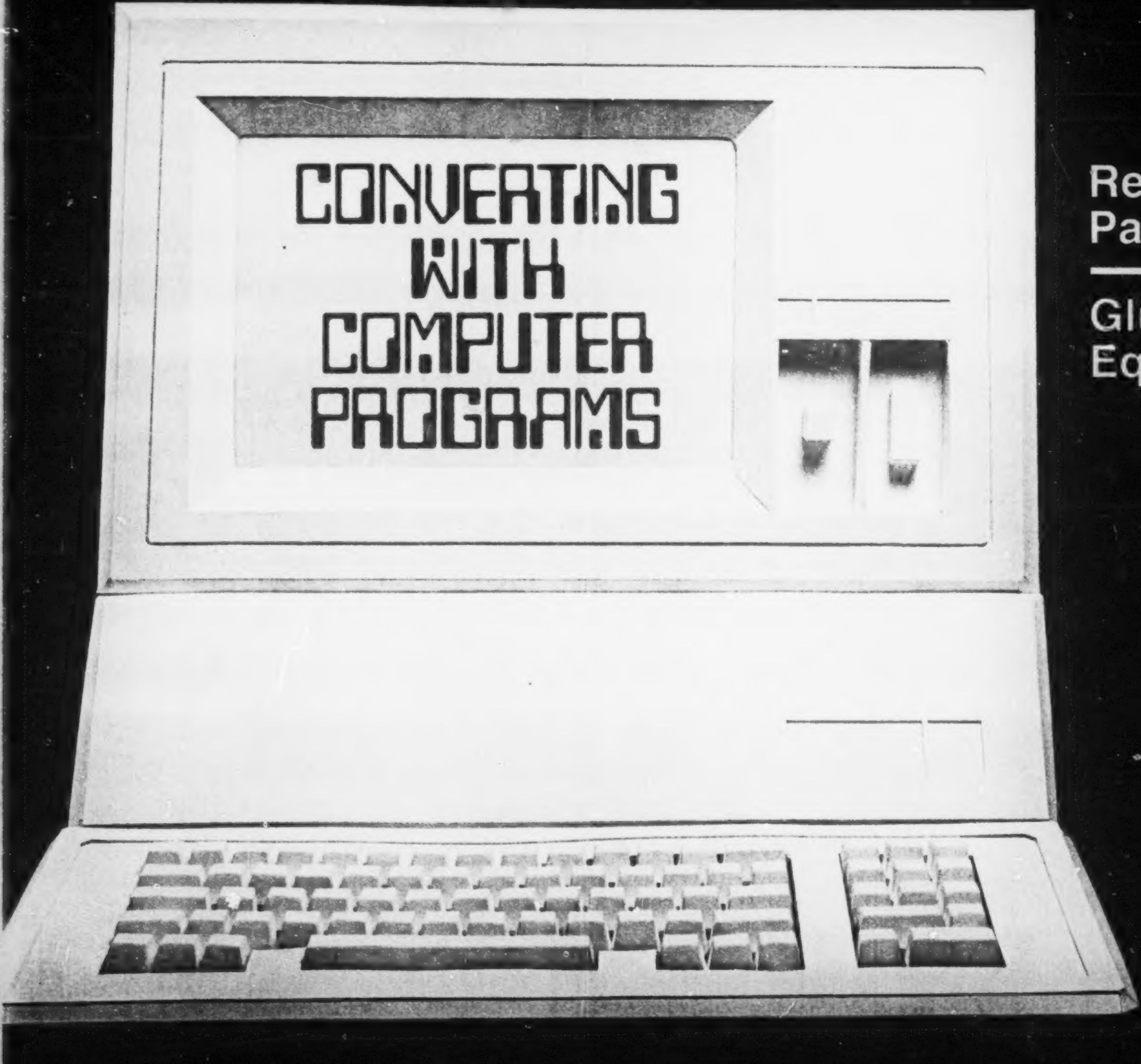
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on the cover

The use of computer programming in the converting industry is examined from a variety of points of view in this issue. Cover photograph by Dick Brockman.

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Revolution in the 1980s: Are You Listening? 36

A call to arms for industry leaders as innovations revolutionize the paperboard market.

by Edward McMahon

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You may not always be able to judge a book by its cover, but many consumers judge a box by its label.

by Jim Lucy, Associate Editor

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Gluing Equipment and Attachments 48

Careful maintenance and the latest attachments can increase your productivity.

by Louis Chapman

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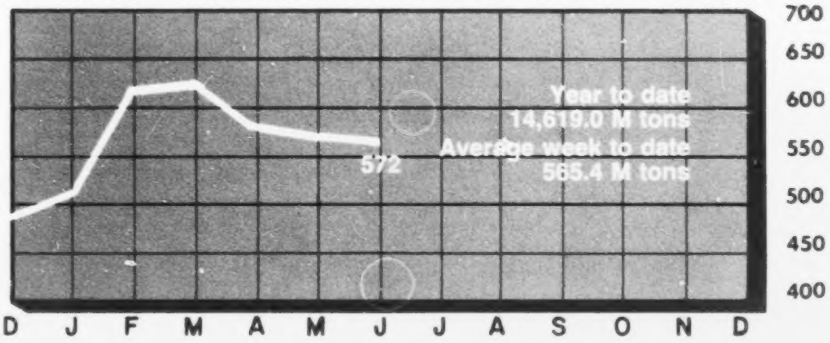

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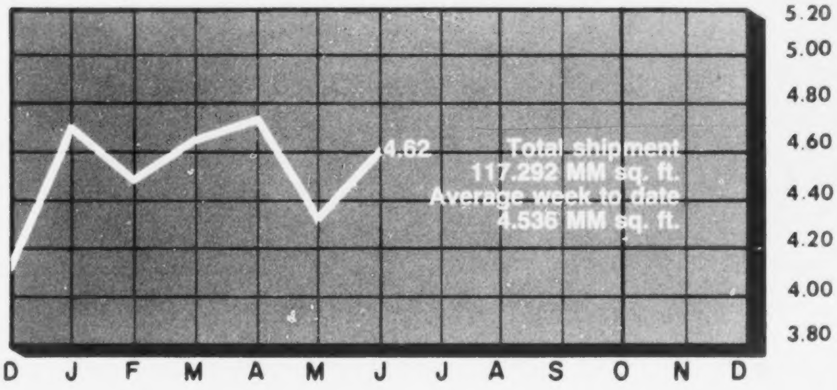

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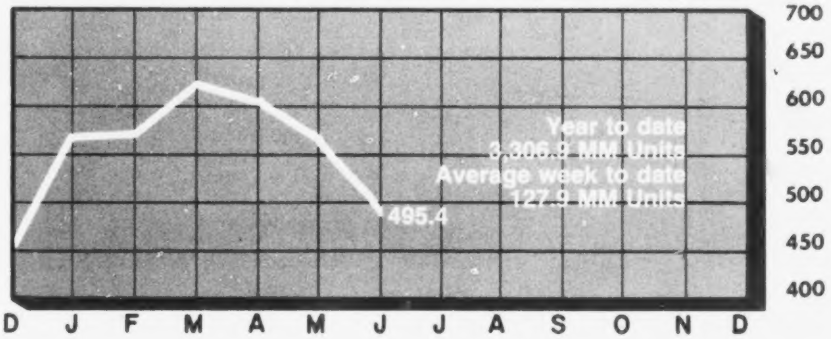

PAPERBOARD-TYPE PRODUCTION: In June, the output comprised some 1802.5 M tons of containerboard and 639.4 M of paperboard, as projected on basis of historic proportions from the API's reported "furnish" tonnages. The former grades were down 8.3% from 1981's month, and paperboards by 10.3%, and their output ratio of 2.8 to 1 showed an improving trend from the 2.85 spread of last year. It may be projected that if this second quarter provides the same proportion of the year's tonnage as that period did last year, then the 1982 reduction will reach some 3.1 million tons.

PAPERBOARD MILL OPERATIONS: The first half of 1982 ended with an average-week board output 8.5% below the 1981 tonnage, compared with a rise of 3.2% in 1981 from 1980, and a drop of 1% in 1980 from 1979. June's volume of 2453.1 M tons was 8.4% down from last year's month, an accelerating rate of decline since at first-quarter-end the margin was less than 7%. For once, paperboard grades are less affected than containerboards. Second-quarter tonnage of the latter was down 11.5% from 1981, compared with "only" 7.6% for paperboard, in a 10.1% total decline.

RIGID PAPER BOXES: Through the first six months of 1982, rigid paper box billings reported by members to the National Paperbox & Packaging Association varied wildly, with some areas showing double-digit improvements over 1981 in one month, and deficits the next, with some showing increases of nearly 60% while others were down. It may be that this signals some sort of permanent evolution, since set-up paperboard tonnage consumed in 1981 was at its lowest ebb in reported history—down by 47% from 1971, and by 52% from 1961, and down 65% from the 1951 volume.

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paper board packaging
STATE OF THE INDUSTRY

Revolution in the 1980s: Are You Listening?

by Edward J. McMahon
President
St. Regis Paper Co.

The following is an edited version of the keynote address presented by Ed McMahon at the Paperboard Packaging Council's Annual Meeting recently held at the Drake Hotel in Chicago.

A call to arms for industry leaders as innovations revolutionize the paperboard market.

A revolution which will dramatically alter our businesses in the decade ahead has already begun and has developed some momentum.

How often have you heard that the folding carton business is mature and not especially noted for innovation? Most of you would be hard-pressed to list even a few major new products, processes or raw materials introduced in the folding carton industry over the past decade.

There have been some significant innovations: ovenable board, TMP (thermo mechanical pulp) and SUS (solid unbleached sulfate) boards, aseptic packaging, variable repeat offset printing, web-fed flexo, laser-die making, etc. But how many of these developments truly presented a broad-based opportunity to expand your market and improve your bottom line profit?

How often have you heard that the way to get to get a customer's attention in a commodity industry where one supplier's product is pretty much like any other's—after all a carton is a carton—is to offer improved package performance at the same or preferably at a lower cost?

Well, some of us in the recycled paperboard industry are now offering such an opportunity—a range of recycled folding paperboard which is rapidly making the term "cylinder" board as obsolete as the rear-wheel cars.

Newsboard up

These new recycled board grades have the appearance, printability, general convertability, lower density and performance characteristics which more closely resemble the quality and performance of solid bleached board—but at a considerably lower price.

To be sure, when these attributes are coupled with the availability of light gray and white backs, not to mention lower calipers, these new, recycled grades would seem to offer a viable and economically attractive alternative to SBS in many end-use markets.

The impact of recycled board has already been dramatic. According to recently released PPC data, (as shown in Figure 1), total folding carton shipments in 1981 were down 1.1 percent, SBS was down 4.5 percent, SUS dropped 9.7 percent, but clay newsboard was the only up segment—7.8 percent.

Was the growth in clay-coated recycled folding carton shipments in 1981 an aberration, a blip in the long-term trend line, or was it a "leading indicator" of what lies in store for us in the 1980s?

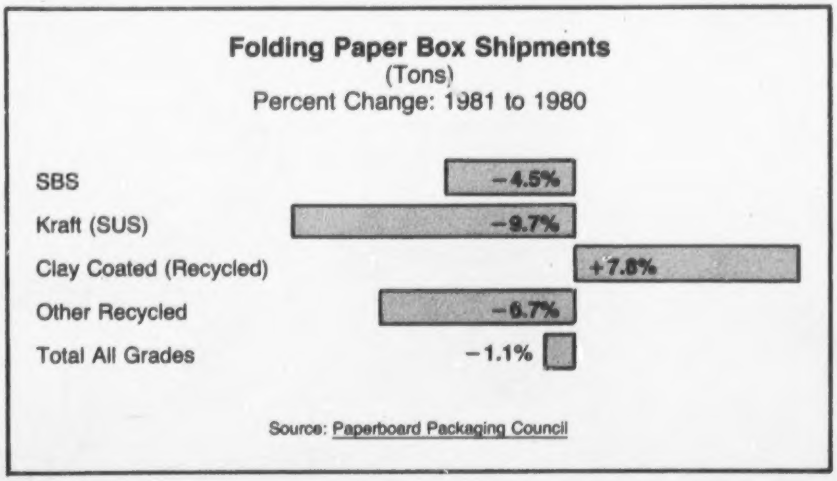
The revolution began in the latter half of the 1970s and has gained momentum as the force of economics, technology and consumerism have propelled clay-coated recycled paperboard to the head of the folding carton pack—if you'll excuse a pun.

This trend will not only continue but probably accelerate throughout the 1980s and beyond.

There are three revolutions driving the total recycled paperboard revolution concurrently underway: technologial, economic and consumer.

Technology revolution

There are still many active cylinder paperboard mills in this country, but they are rapidly becoming a dying breed. Technological and economic forces are combining to drive these mills out of business—and by the end of the century they will be as extinct as the tube radio or the mechanical calculator is today.



Source: Paperboard Packaging Council

Figure 1

Recycled Board

continued

The cylinder board industry was at a technological standstill until the mid-to-late 1950s when the Stevens former with pressurized head boxes was introduced. These machines not only enabled higher speed production but produced a better formed, more uniform sheet with better control and, therefore, less variability in weight, caliper and stiffness.

Almost a decade later, in the mid-1960s, the next change came when Kobayashi introduced the Ultra-Former. This pressure former operated at about the same speed as the Stevens former but produced an even more uniform sheet with greatly improved ply-bonding, more comparable to board made on a Fourdrinier machine. Most importantly, the Ultra-Former permitted the first reduction in basis weights—in some mills about two percent to three percent less fiber than the industry standard for cylinder boards.

From a converter's standpoint, recycled paperboard produced on a Stevens or Ultra-Former offered both a better printing service and cut and creased easier on the converting equipment. Its stiffness ratio—machine direction to cross direction—was less than cylinder board but more than SBS—a factor which took some getting used to.

Therefore, in your plants and in your customers' plants, this new generation of recycled paperboard performed more like SBS board, which, in the 1980s, had become the standard of competition.

Attack begins

The technology attack on cylinder paperboard mills had begun. The American Paper Institute reports that since 1970 a total of 75 recycled paperboard machines accounting for 2.2 million tons or 20 percent production of all grades were shut down. Many large mills rebuilt their cylinder machines adding Stevens, BRDA and Ultra-Formers in the latter half of the 1960s and in the early 1970s. For many reasons others deferred this investment and faced the prospect of shutdown in later years.

Significantly, the Stevens and Ultra-Formers also enabled mills to produce lower caliper boards. Whereas cylinder machines could produce as low as .015 board, most preferred to stay at .016 and above. The Stevens and Ultra-Formers, however, could produce .014 to compete in some end-use markets which had previously been the exclusive domain of virgin board.

About the same time, the mid 1960s, the next technology change came when Beloit's Inver-Former was installed at Federal's Sprague mill. This machine produced a board with somewhat lower stiffness ratio than Stevens or Ultra-Formed board but had the capability of going down as low as .010 or .011 caliper.

Moreover, it could do so at about five percent to ten percent lower basis weight than standard cylinder board, or three percent to eight percent less fiber than Ultra-Formed board. Altogether this posed an even greater challenge to SBS in some end-use markets.

Progress continues

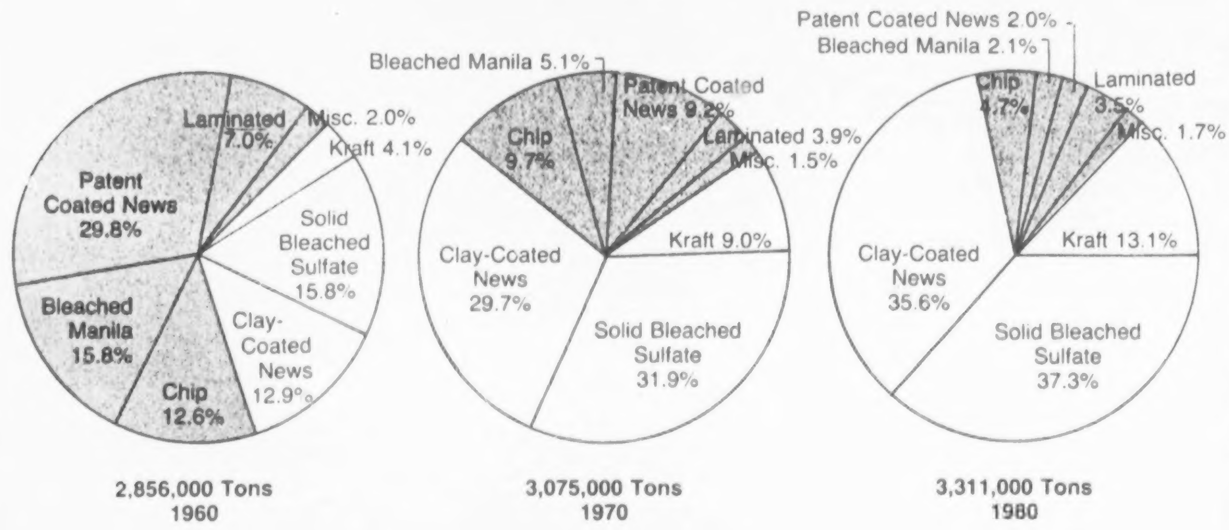
In 1975, the Continental Group of Canada acquired the next generation of technology when it purchased the Manchester machine for its Toronto recycled mill.

This machine was equipped with a pressurized head box and vacuum/suction formers, making it capable of faster web formation at five percent lower basis weights than cylinder board standard weights. It had a caliper range of .012 to .036—the first machine with such a wide range. Diamond International later selected the Manchester in its rebuild of the Middletown mill.

Regis rebuilds

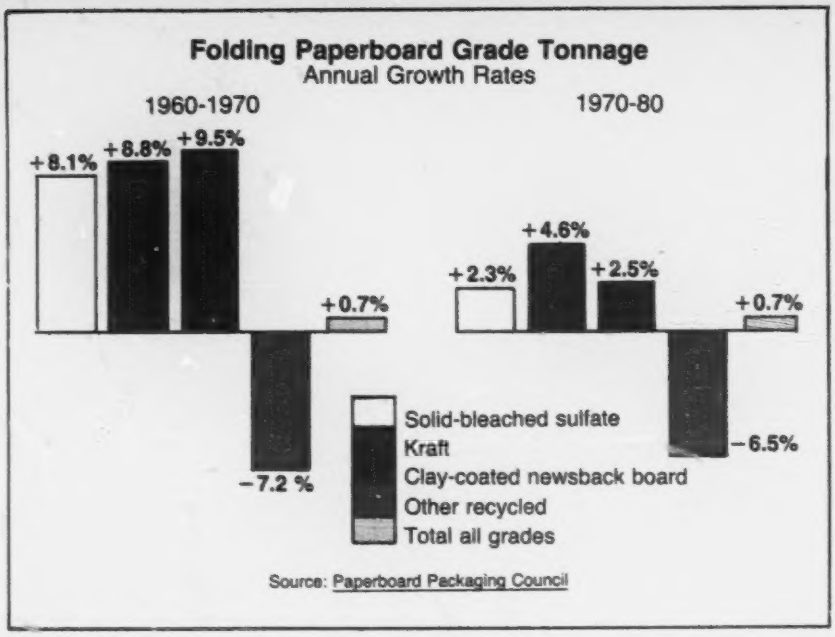
In 1977-78, the St. Regis Paper Co., conducted extensive evaluations of all the technology options available to rebuild the cylinder machine in its Angell Street mill in Battle Creek,

Folding Paper Box Industry
Paperboard Grades Tonnage Mix



Source: Paperboard Packaging Council

Figure 2



Source: Paperboard Packaging Council

Figure 3

Mich. We had already rebuilt the two machines in our Fountain mill in the mid-1960s with Stevens and Ultra-Formers. We established our key criteria for the 1980s as:

- quality, uniformity and consistency
- good machinability on converting and packaging equipment—comparable to SBS performance
- lower density board to improve economics
- faster production to improve economics
- lower caliper capability to enter new markets and
- new board grade capability—light and white backs to enter new markets and compete with SBS.

The answer was relatively easy—multi-layer Fourdrinier technology used in SBS manufacture. We also selected Beloit's Bel Bond former.

Our start up saga began in 1979. Here we are about three years later having spent many more dollars than we planned and suffered through a much longer learning curve than we planned.

We are confident, however, that we turned the corner in 1981 and are on our way up. Adjusting to "space technology," as it were, takes time. Nonetheless, we have, so far, accomplished the following on our Angel machine:

- The bulking of the fibers in the Fourdrinier process resulting in a paperboard which is more like a mattress than a plank.
- A board that prints, cuts, scores, glues and forms more like an SBS sheet than cylinder board.
- A board that runs efficiently on high speed machinery.
- The multi-headbox Fourdrinier process with its twin-wire formers virtually eliminates any plybond problems as the inner and intraplybond are of equal strength.
- The machine now produces a clay-coated recycled board with ten percent to 15 percent less basis weight in the .012-.016 caliper range.
- The machine actually runs about twice as fast as either the the Ultra or Stevens formers, effectively doubling our capacity.

We are now producing a new Angelbrite® board with 50 and 70 GE brightness backside, using 100 percent recycled furnish—both grades being offered in .012-.026 caliper range as a lower cost substitute for SBS in many end-use applications.

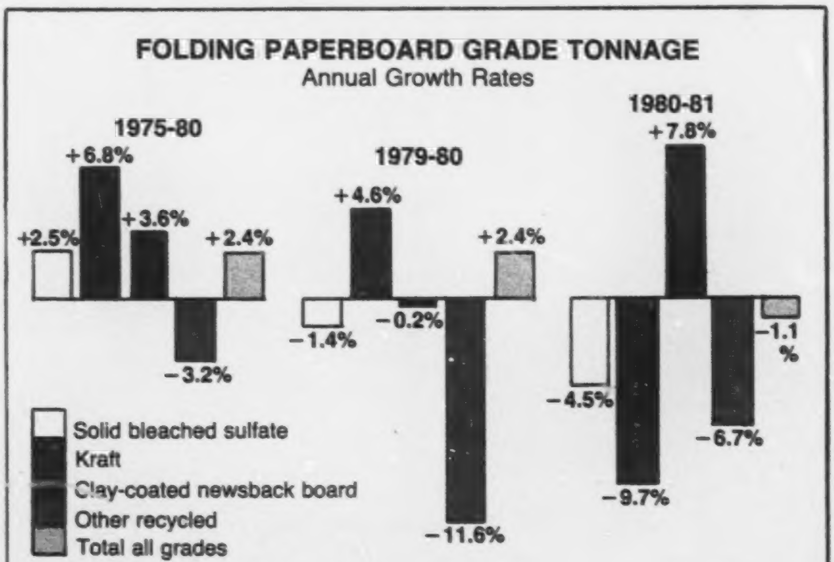
The economic revolution

In the post-war period we witnessed a steady erosion in the rural population and an accelerated population shift toward the cities and their suburbs. Families grew smaller and we later saw an upsurge in one and two-person households. These new demographic patterns coupled with rising labor and distribution costs led to the virtual demise of the "Mom and Pop" stores and the rapid rise of self-service supermarkets.

These phenomena resulted in accelerated demand for convenience packaging that would display well on the shelf with eye-catching graphics which sell the products, hold up under the rigors of modern distribution, run efficiently on high-speed closing equipment and convert efficiently in your folding cartons.

The impact of these revolutionary trends on the folding carton, and indeed on the entire packaging industry, has been far reaching. Referring to Figure 2, an examination will show how trends in folding carton shipments during the last two decades relate to the mix of paperboard used. All of this analysis is based on PPC tonnage data.

In 1960, the "other recycled" category, in Figure 2, accounted for 67 percent of total folding carton shipments. The dominant grades in this category were white patent coated news with 30 percent and white



Source: Paperboard Packaging Council

Figure 4

Recycled Board

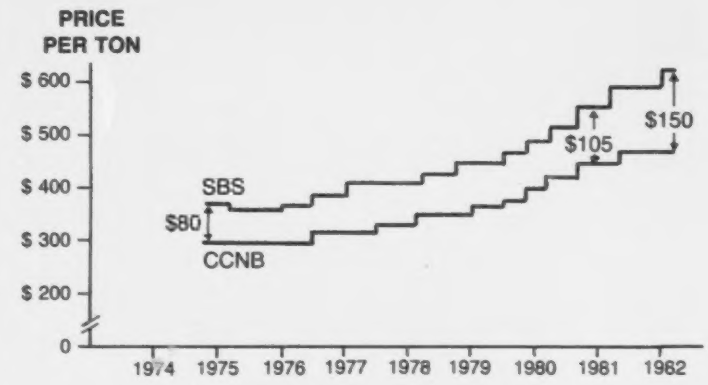
continued

bleached manila with 16 percent of the total market. Clay-coated newsback represented only 13 percent and solid bleach sulfate 16 percent of total shipments.

By 1970 "other recycled" had precipitously dropped to 29 percent, or less than half its market share a decade earlier. To meet the more demanding graphics, packaging machinability and converting requirements, clay-coated newsback and solid bleached board replaced bleached manila and patent coated news in many dry product markets and moved into other enduse markets such as ice cream, frozen foods, perishable bakery and personal care products.

SBS had doubled its share to 32 percent, making it the dominant single paperboard grade, but clay-coated news moved up close behind, more than doubling its share to 30 percent. Kraft also more than doubled its share to nine percent as it dominated the beverage carrier and multipak markets.

Folding Paperboard Price Trends
Solid-Bleached Sulfate & Clay-Coated News



SOURCE: OFFICIAL BOARD MARKETS

Figure 5

Trend continues

In the next decade this trend continued although at a somewhat moderated pace. "Other recycled" had dropped half its share once again and in 1980 accounted for only 14 percent of total folding carton shipments.

Clay-coated newsback achieved the greatest gain during the 1970s as its share rose to 36 percent in 1980, but solid-bleached sulfate board continued to hold a slight edge at 37 percent.

Solid-bleached sulfate and clay-coated newsboard have emerged as the dominant folding paperboard grades—each approximately 1,200,000 tons, or together about 73

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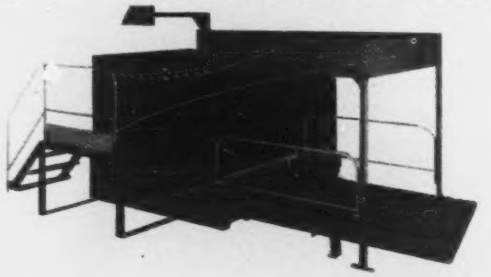

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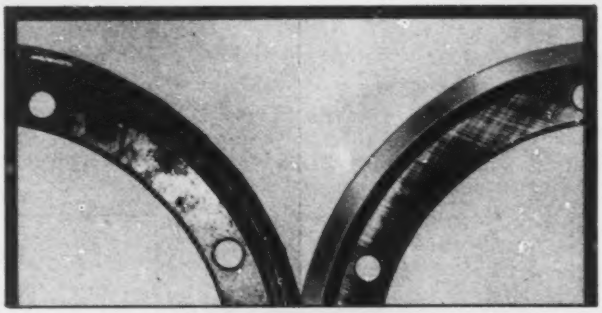

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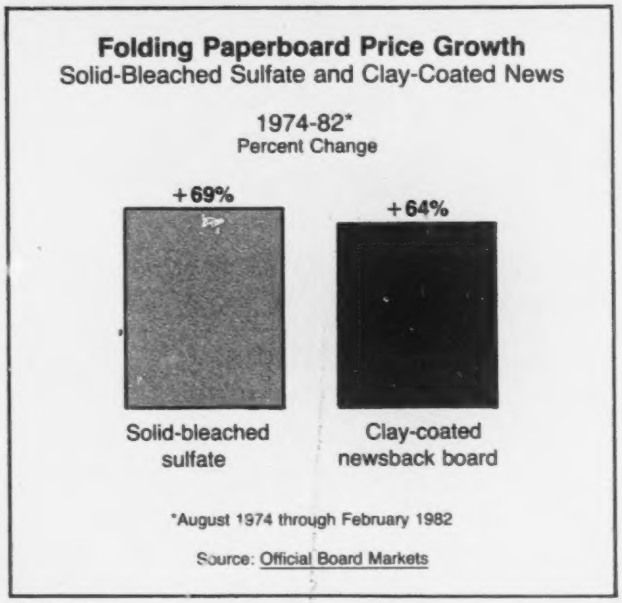
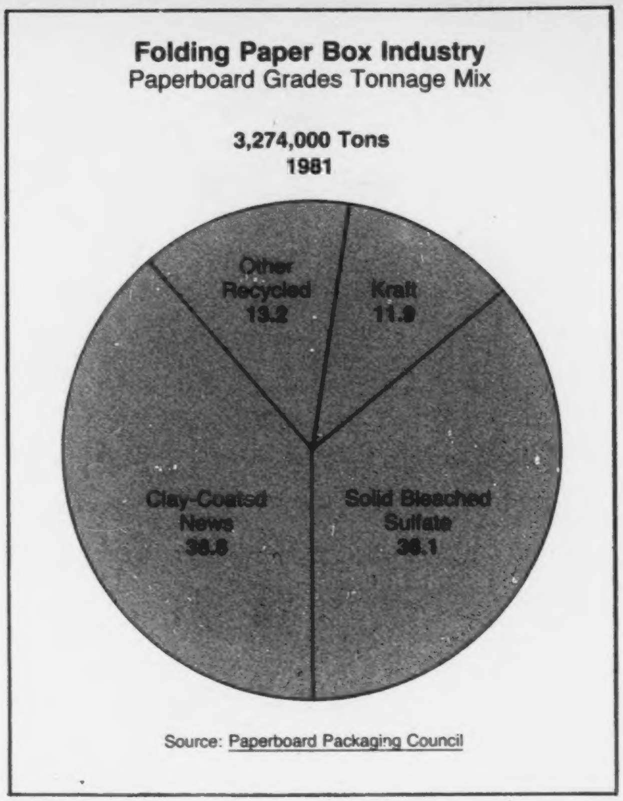
Recycled Board *continued*


Folding Paperboard Price Growth
Solid-Bleached Sulfate and Clay-Coated News

*August 1974 through February 1982

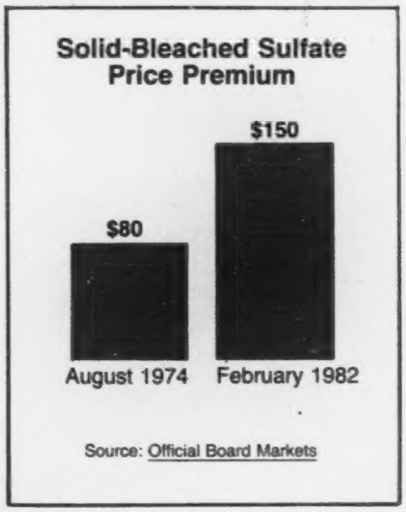
Source: Official Board Markets

Figure 6


Folding Paper Box Industry
Paperboard Grades Tonnage Mix

Source: Paperboard Packaging Council

Figure 8


Solid-Bleached Sulfate Price Premium

Source: Official Board Markets

Figure 7

percent of the folding carton board market in 1980.

Figure 3 shows that the market in total has grown at an annual rate of .7 of one percent in each of the past two decades.

However, clay-coated news grew at a 9.5 percent annual rate in the 1960s and 2.5 percent in the 1970s—somewhat faster than the 8.1 percent and 2.3 percent annual growth rates for solid bleached board.

Other recycled grades were declining at about seven percent during this period. These divergent trends explain the dramatic shift in the paperboard mix shown in the previous pie chart.

Dramatic breakthrough

On the average, according to Figure 4, clay-coated newsboard grew at an annual rate of 3.6 percent between 1975 and 1980, while SBS grew at 2.5 percent rate, and the market as a whole moved ahead at a 2.4 percent annual rate. In 1979-80, when the total market was up 2.4 percent, solid bleached board was down 1.4 percent but clay-coated recycled edged lower by only 0.2 percent.

PPC data issued recently reveals a truly dramatic breakthrough for clay-coated recycled board in 1981—it was the only growth segment, leaping ahead 7.8 percent, while solid bleached board was off 4.5 percent and the market as a whole was down 1.1 percent.

Based on these statistics, clay-coated news now moved to the top of the pack, accounting for almost 39 percent, with SBS share dropping to 36 percent.

Price trends

Of course, one year does not a trend make. Figure 5 traces the relative price trends since 1974 of the two major folding paperboard grades—clay-coated newsboard and solid bleached board—as reported in the Official Board Markets.

Until the late 1970s, the price advances of clay-coated news and solid bleached board closely paralleled each other, maintaining a relatively steady differential of $70 to $80 per ton. The first significant change in this pattern came in the late 1979 to mid 1980 period when the SBS price premium had risen to the $85 to $95 per ton range.

The next big breakthrough came late in the third quarter of 1980 when the price differential as reported in the "Yellow Sheet" broke the $100 mark.

Barrier breaks

Apparently, once this barrier had been broken it was onward and upward. By early 1981, the SBS price premium had reached $115 per ton. On Jan. 1 of this year, when the last SBS price increase to $625 per ton was reported in the Yellow Sheet, the price premium had jumped to $150 per ton.

Perhaps it is for this reason that clay-coated recycled board surged ahead last year while SBS volumne declined.

As Figure 6 indicates, on a relative basis, the price increases of both board grades were comparable. From August, 1, 1974 until recently clay-coated newsboard reported prices rose 64 percent. During this same period SBS reported prices were increased 69 percent. The SBS price premium during this approximately seven year period ranged from 18 percent to 24 percent.

But as all businessmen know, we

don't take percentages to the bank. Figure 7 underscores the fact that the price differential for SBS has virtually doubled in the past seven years from $80 to $150 per ton.

That's a premium that your customers can no longer afford as they struggle to keep their costs under control and battle for their share of the consumer's shrinking real, disposable income. As long as this price premium continues, none of you heavily committed to SBS can afford to ignore this threat—which also offers all of you a major profit opportunity.

It is this insidious inflation which we have experienced since 1974 which has forced a greater cost-consciousness on the part of the American consumer and your customers. This market challenge, coupled with lower cost of board produced from recycled fibers has thrust clay-coated newsboard into a new era in the 1980s, and in 1981 lifted this board grade to the number one position in your industry—nearly 39 percent versus 36 percent for SBS, as seen in Figure 8.

The consumer revolution

In addition to consumer pressures on your customers to hold the line on prices, there is truly another consumer revolution underway. This revolution is aimed at increasing the general public awareness of both the economic and environmental virtues of folding cartons made from recycled board.

Interestingly, this consumer revolution had its origin in 1974 when the American Paper Institute formed the Recycled Paperboard Division. That group's first major action was to retain Elrick and Lavidge, a Chicago market research firm, to conduct a survey of consumer attitudes toward recycled paperboard packaging.

Contrary to the opinion of many packaged goods marketers, the principal conclusion of the survey was that consumers had no bias against recycled paperboard packaging.

Actually, 90 percent of those surveyed said they would choose recycled—and 50 percent said they would switch from one national brand to another of products packaged in recycled paperboard. A powerful dormant consumer force for recycled paperboard was uncovered.

API retained a public relations firm and the "Gray Is Beautiful" campaign was launched in 1976. It was the first phase of an overall awareness program designed to educate consumers about the benefits of recycled paperboard—what it is and how to identify it.

The objective was to make people aware of the cyclical nature of recycling and the importance of keeping up the demand for the end products of newspaper collection programs. Paper recycling really starts with demand in the supermarket—and shoppers can complete the cycle by buying products packaged in recycled paperboard.

Having discussed the three revolutions that are currently underway, it is obvious that all the ingredients are not only present, but the eruption has already taken place. But like all successful revolutions, there must be a leader or catalyst to keep the ball moving forward and sustain the momemtum.

All you leaders in the field should seize the opportunity. Most of the forces are already at work, but there is an important job that remains for you. ☐

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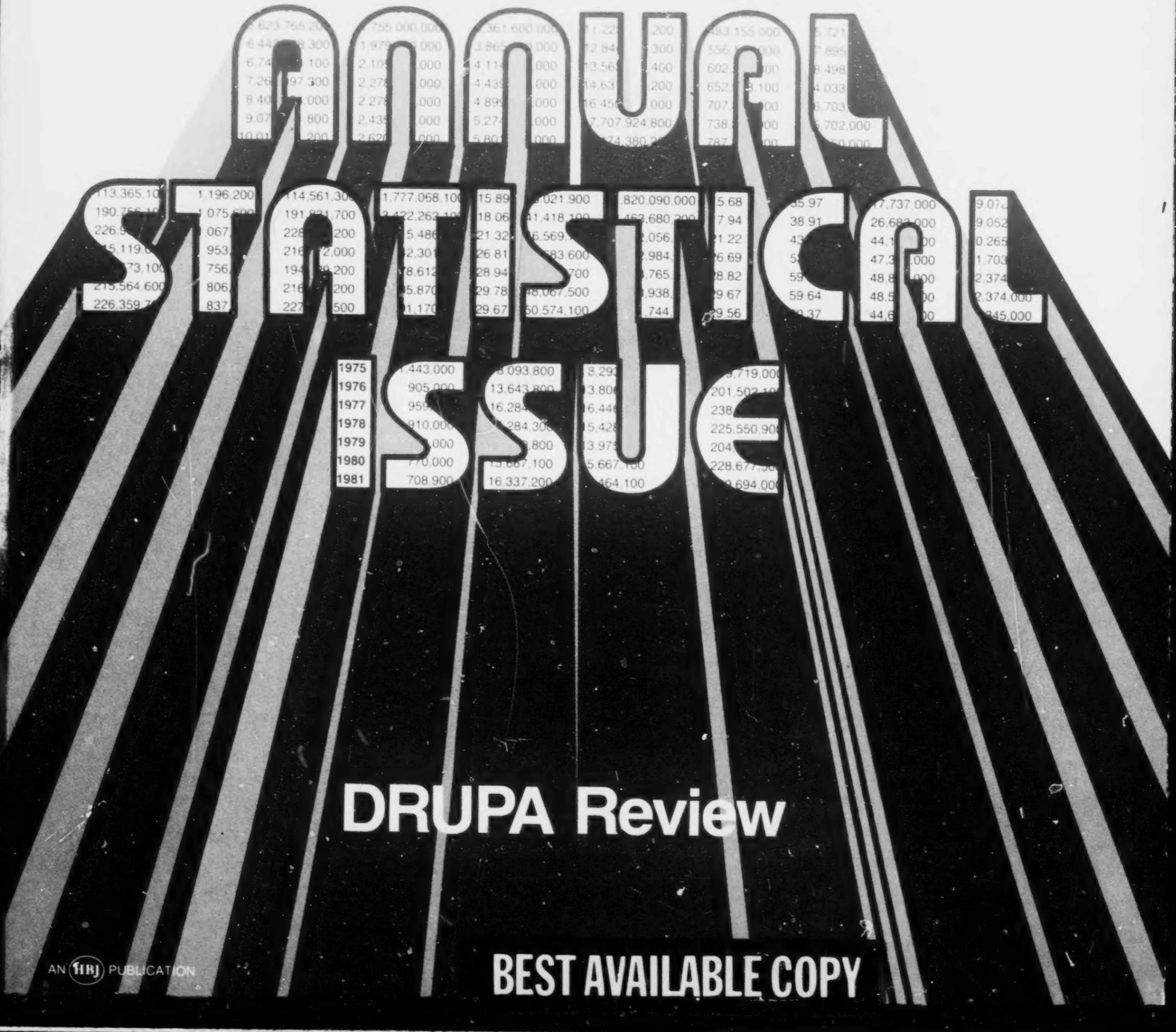

ANNUAL STATISTICAL ISSUE

DRUPA Review

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vol 67 no. 9

September 1982

paper board packaging
ANNUAL STATISTICAL ISSUE
DRUPA Review

on the cover

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INDUSTRY STATISTICS

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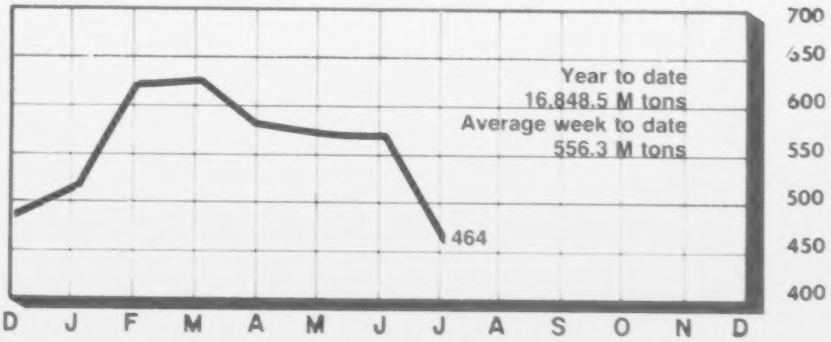
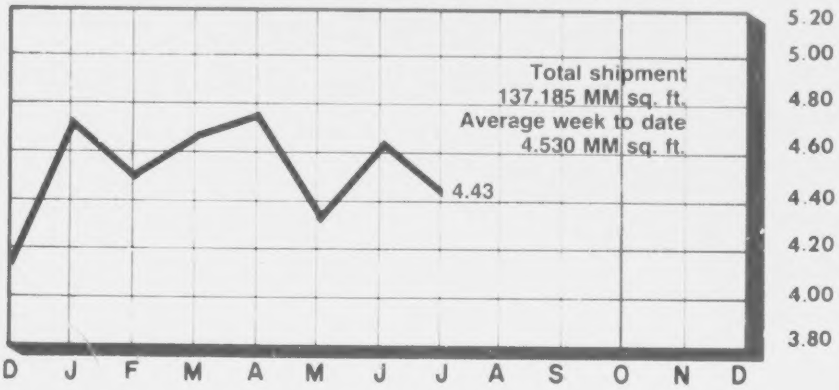
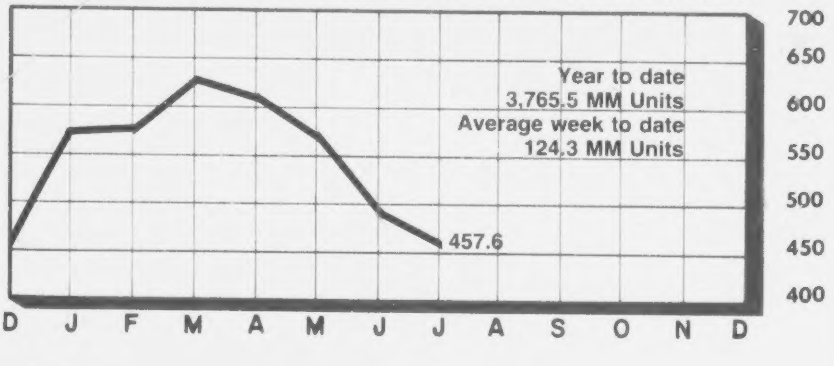


FIBRE BOX SHIPMENTS 1982 •WEEKLY AVERAGE Billion Sq. Ft.



COMPOSITE CAN OUTPUT 1982 •WEEKLY AVERAGE Million Units



PAPERBOARD-TYPE PRODUCTION:

In July, 1504.3 M. tons of containerboard volume was down 27% from the 1981 month, while 549.1 M of paperboards reflected an 8.2% drop—both as projected from the API's "production by furnish" data. This devastating tonnage ratio of 2.75-to-1 compares with a traditional 2-to-1. Further, that 1981 month's paperboard volume was 6% below '80, which had been 4% down from '79, which was 5.3% below '79—possibly reflecting a long-term decline for these packaging boards, in the face of aggressively successful competing materials.

PAPERBOARD MILL OPERATIONS:

The first month of 1982's second half marked a continuation of the downturn in the second quarter and indeed since last year's fourth quarter. The July volume of 2053.4 M tons was 23.5% down from 1981, which had been 8.4% up from '80. This decline is due largely to repeated curtailments of production at mills, in the face of stagnant conversion demand and bulging inventories. Mid-year stocks on hand were 360,000 tons about '81, up to 8.2 weeks of supply on hand—22% above last year's margin, while shipments of fibre boxes remained 6.3% below the 1981 footage.

RIGID PAPER BOXES:

Through July, major set-up boxmakers report a national rise of some 8% in total billings, compared with 11% in 1981 over '80, 7% in 1980 over '79, 8% in '79 over '78, and 5% in '78 over '77. Thus, on a long-term basis, dollar value of the rigid box market has not kept pace with double-digit inflation. Again, the "point spread" is remarkable between and among regional sectors, with improvements well above 20% in some brisk Eastern areas comparing with similar declines in the economically stricken Midwest, where little business upturn has shown any sign of appearing thus far.

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INDUSTRY
STATISTICS

Some company officials are cautiously optimistic about the economic future, while others are not so sure.

Recession Leaves Its Mark on Forest-Related-Products Industry

by Fred A. Sharring
Senior Editor
Paperboard Packaging,
Editor
Official Board Markets

This second half of 1982 opened with the forest-products-related industries at their most distressed ebb in modern history—to the extent that the chief executive of a prominent integrated firm has observed "We are managing not for growth, but for survival."

During this year's recessed second quarter, nine of the two-dozen largest U.S. and Canadian producers suffered net losses from operations—a record never before approached even in the Great Depression of the 1930s. The average of all was 65% below the previous year's quarter. Indeed, ten of the 24 had net profits below those of a decade ago.

In the expression of the same chief executive: "There is a growing concern that what is happening . . . is considerably more serious than the normal cyclical downturn . . . There is a risk that deep-seated long-term structural changes are taking place as a result of changes in lifestyle and U.S. economic policies."

"We are managing not for growth, but for survival."

There can be no doubt that some upturn in business will develop. A question remains as to how far and how soon. The world economy retains too much vitality for stagnation. At the same time, those who look for a return to "business as usual" levels of previous years are very likely to be disappointed. The depletion of our easily-reached resources and the overhang of a population in excess of our production needs have gone too far for a revival of that relatively easy life.

Some remarks of industry leaders give an insight into the current view and mood. International Paper chairman Dr. Edwin A. Gee says "We expect results from our manufacturing operations to continue to be depressed until there is some meaningful improvement in the economic environment." Mead chairman Burnell R. Roberts adds that the company sees limited improvement in its major markets during the balance of the year. "Economic conditions present a real challenge for the entire forest products industry."

Owens-Illinois chairman Edwin D. Dodd feels that the present climate "has dampened the enthusiasm of industry to invest in expansion, rebuild inventories or add employees until there are signs of a lasting recovery. For these reasons, we do not expect our situation to show marked improvement until economic conditions improve."

Scott Paper president Philip E. Lippincott: "Looking ahead to the second half of 1982, we see no clear indications that the U.S. and world economies are improving." Notes chairman Andrew C. Sigler of Champion International: "Except for a slight seasonal improvement in our building products business, there is nothing new to report. We keep reading that an upturn has begun, but we certainly don't see it in any of our businesses." Crown Zellerbach chairman William T. Creson observes that the persistence of the recession . . . has caused the company to scale down 1982 capital investment plans.

"We keep reading that an upturn has begun but we certainly don't see it in any of our businesses."
—Andrew C. Sigler
Champion International

Potlatch chairman Richard B. Madden observes that "There is nothing encouraging about the near-term outlook. We remain hopeful, but not optimistic, that the economy soon will begin to grow again and that Potlatch will see stronger demand for our diversified line of pulp-based products." Two chief executives voice some portion of optimism. Georgia-Pacific chairman Robert E. Flowerree says "The forest products industry continues to experience its deepest recession since the end of World War II, but we feel the low in building products markets was reached this spring." And president Peter J. McLaughlin of Union

Statistics *continued*

Camp summarizes that, in the near-term outlook, "There is as yet no indication of a recovery in economic conditions as they relate to our industry. We should, however, see a pickup later this year in the overall economy and, with that, a gradual improvement in our markets." Regarding his firm's recent construction startup on a $600-million pulp/paper mill project in the Southeast, he adds, "Our decision to proceed with this major project is a clear reflection of our confidence in the long-term outlook for both this product line and our company."

So—a bedrock of confidence does persist toward ultimate recovery, and it undoubtedly will come. But what will the landscape look like when this avalanche melts? What market will remain for the packaging industry's products, in an economy under the new prospects?

One clue was suggested by a leading economist, recently addressing an industry conference. He pointed out that as recently as 1975, the "American dream" of a single-family home and an average automobile could be purchased by the average family for 30% of its annual income. Today, the figure is 55%.

In short, that brief space of time has seen a reduction of one-third in the "discretionary" income available to the typical family for its purchases of packaged goods, from transcontinental produce shipping containers to the picnic popcorn bucket.

It is difficult to see how the earlier levels of consumer-product demand are any more likely to return than is the 30-cent gallon of gasoline. And it must seem that the producers who prepare themselves for this basic shrinkage of markets are the most likely to survive it.

1981 Production Increase Is Below Average

Paperboard in the General Economy

Table A-1—For the seventh consecutive year, total U.S. production of paper and board reached an all-time high in 1981, up 1.4% from '80, but a bit below the 2% annual average over the decade and far below the 4.2% average since 1961. These totals include non-packaging grades, as tabulated by the federal Dept. of Commerce, but which are not compiled into American Paper Institute reports.

Table A-2—An unusual development in 1981 is that the average citizen represented identical shares of paper and board production for the second consecutive year—tonnage having gone up precisely in proportion to population. Per-capita pounds are up 11% in ten years, 50% in 20 years, and 117% since 1941. However, of the 313.5-pound increase per person since the latter World War II year, some two-thirds is in paperboard grades, due to expansion in packaging.

Table A-3 — Nearly three paperboard containers of the basic types listed accrued to the personal use of each average U.S. citizen in each day of 1981. This is an increase of only 3% in ten years, but of 122% over 40 years. In addition to these, an estimated 30 billion annual containers for milk, foods and various special packagings bring the total significantly higher. Evolutions in packaging popularity are evident in these totals. Over the 30 years of intensive industrial expansion since 1951, for example, the individual's share of corrugated shipping containers went up 140%, but folding

A-1 — Board & Paper Tonnage Relationship (tons)

Year	Paperboard	%	Paper	%	Total Paperboard and Paper	%
1941	8,400,000	47.3	9,362,400	52.7	17,762,400	100.0
1951	13,037,700	50.1	13,010,400	49.9	26,048,100	100.0
1961	18,441,000	51.8	17,143,700	48.2	35,584,700	100.0
1971	28,356,397	52.3	25,822,248	47.7	54,178,645	100.0
1972	31,041,700	52.2	28,425,150	47.8	59,466,850	100.0
1973	32,815,100	53.1	29,014,900	46.9	61,830,000	100.0
1974	30,087,800	50.6	29,421,100	49.4	59,508,900	100.0
1975	26,673,100	51.0	25,595,900	49.0	52,269,000	100.0
1976	29,024,800	51.3	27,580,000	48.7	56,604,800	100.0
1977	31,669,000	52.1	29,074,000	47.9	60,743,000	100.0
1978	34,337,000	55.3	27,729,000	44.7	62,066,000	100.0
1979	35,641,000	55.4	28,733,000	44.6	64,374,000	100.0
1980	35,862,000	55.4	28,912,000	44.6	64,774,000	100.0
1981	36,364,000	55.4	29,317,000	44.6	65,681,000	100.0

Source: Bureau of Census and U.S. Pulp Producers Assn. Paperboard tons exceed classification of American Paper Institute in Paperboard Section of this issue through inclusion of certain boards not classified in Institute figures.

A-2 — Per Capita Production, Paperboard & Paper (pounds)

Year	U.S. Population	Paperboard	Paper	Total Paperboard & Paper
1941	133,060,000	126.3	140.7	267.0
1951	154,360,000	168.9	168.6	337.5
1961	183,650,000	200.8	186.7	387.5
1971	207,006,000	274.0	249.5	523.5
1972	208,842,000	297.3	272.8	570.1
1973	210,404,000	311.9	275.8	587.7
1974	211,909,000	284.0	277.7	561.7
1975	213,641,000	249.7	239.6	489.3
1976	214,659,000	270.4	257.0	527.4
1977	216,383,000	292.8	268.8	561.6
1978	218,228,000	314.7	254.1	568.8
1979	220,099,000	323.9	261.1	585.0
1980	223,174,000	321.4	259.1	580.5
1981	226,292,000	321.4	259.1	580.5

Source: Based on Tabel A-1 and mid-year population estimate of Bureau of Census

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Statistics *continued*

cartons by only 30%. However, the most striking illustration of rising and falling fortunes in packaging is that in the same three decades, use of the rigid paper set-up box — oldest of all paperboard packaging forms — actually dropped by 50%. In contrast, use of the newest form — composite cans/tubes, went up 200% in the same period.

Table A-4—Total value of unconverted U.S. paperboard in 1981 exceeded $11.5 billion, up 11.4% from '80. That rise combines a 10% advance in average-ton price with the 1.4% output expansion. The impact of energy-cost increases on manufacturing, since the 1973 OPEC oil price escalation, is nowhere better reflected than by paperboard prices.

In the entire ten years between 1951 and '61, average-ton price increased less than 1%. Between then and 1971, the total price was less than 5%. But in eight years between 1973 and '81, the price explosion has been 152%. From another view—the dollar-price rise in these latest eight years has been 18 times greater than in the previous 22 years.

Some part of that price surge must be attributed to upgrading of packaging materials in the course of intensive marketing. With a tonnage rise of 28% over ten years, a value rise of 222% is hardly warranted even with the ten-fold increase in oil price. A clue appears in the consumption of expensive solid bleached sulfate board. Between 1960 and '70 the consumed tonnage of SBS rose 60%. But between '70

A-4 — Paperboard Annual Tons & Values

Year	Tons	Value (in billions)	Value Per Ton
1941	8,400,000	$458,388	$54.57
1951	13,037,700	1,552,303	119.06
1961	18,441,000	2,213,372	120.02
1971	28,356,397	3,570,354	125.91
1972	31,041,700	3,919,639	126.27
1973	32,815,100	4,246,809	129.41
1974	30,087,800	4,715,070	152.70
1975	26,673,100	4,614,723	173.01
1976	29	5,518,022	190.11
1977	34,337,000	6,923,794	218.63
1978	35,641,000	7,629,681	222.20
1979	35,862,000	9,007,169	252.72
1980	36,364,000	10,335,428	288.20
1981		11,516,115	316.69

Source: Tons and values are Bureau of Census. Tonnage figures vary from those of American Paper Institute through inclusion of certain boards not classified in Institute figures.

A-3 — Principal Paperboard Packages Used, Per Day & Per Year*

	M containers used per day						
Year	Corrugated & Solid Fibre	Folding	Set-up	Cans & Tubes	Drums	Total Per Day	M. Containers Total Per Year
1941	10,440	142,000	17,320	3,990	21	173,731	63,400,000
1951	21,250	262,000	19,900	15,500	69	318,719	116,417,200
1961	31,518	371,800	14,400	16,200	82	435,300	158,600,000
1971	55,391	467,700	14,727	42,870	130	581,988	212,425,600
1972	61,234	481,178	14,964	49,440	137	606,953	225,188,300
1973	65,888	489,839	16,580	53,346	145	625,798	228,416,300
1974	62,427	482,337	14,689	56,360	153	615,966	224,829,700
1975	56,175	448,574	11,082	53,451	130	570,582	207,930,300
1976	62,972	488,496	12,068	59,705	151	623,392	227,694,000
1977	66,123	497,350	13,070	64,303	163	641,009	233,968,000
1978	70,983	515,254	14,168	66,993	176	667,174	243,685,300
1979	76,121	517,892	15,058	69,070	184	678,325	247,758,200
1980	73,307	505,453	14,671	67,296	188	660,915	241,234,000
1981	74,757	499,799	14,337	67,824	190	656,907	239,771,000
1981 Per Capita Use	**0.330**	**2.209**	**0.064**	**0.298**	**0.0008**	**2.902**	**1.059**

*Exclusive of certain sanitary containers

A-5 — Value of Principal Converted Paperboard Products Shipments

Year	Fibre Boxes	Folding Cartons	Rigid Boxes	Other Converted Board Products	Grand Total
1941	$389,982,200	$187,749,000	$95,019,000	$133,400,000	$806,150,200
1951	1,316,212,800	774,844,000	250,000,000	430,000,000	2,771,116,800
1961	1,820,090,00	941,870,300	236,578,000	1,069,111,000	4,067,649,300
1971	3,463,680,200	1,250,000,000	411,354,000	2,088,129,000	7,213,163,200
1972	3,959,924,500	1,325,000,000	437,681,100	2,331,601,000	8,054,206,500
1973	4,862,056,300	1,460,000,000	484,950,000	2,751,281,000	9,558,287,300
1974	5,792,984,900	1,694,980,000	536,900,000	3,246,641,000	11,271,505,900
1975	5,623,765,200	1,755,000,000	483,155,000	3,361,600,000	11,223,520,200
1976	6,443,938,300	1,979,000,000	556,111,000	3,865,840,000	12,844,889,300
1977	6,741,744,100	2,105,000,000	602,268,300	4,114,413,000	13,563,425,400
1978	7,260,097,300	2,278,000,000	652,968,100	4,439,452,000	14,631,406,200
1979	8,407,894,000	2,435,000,000	707,878,000	4,899,699,000	16,450,471,000
1980	9,075,381,800	2,620,000,000	738,317,000	5,274,226,000	17,707,924,800
1981	10,019,521,200	2,866,000,000	787,800,000	5,801,059,000	19,474,380,200

Sources: Fibre Boxes, Fibre Box Assn.; Folding Cartons, Bureau of Census and Paperboard Council. Set-up Boxes, Bureau of Census and Natl. Paperbox & Packaging Assn.; Other, including cans, tubes, drums sanitary containers and die-cut paperboard, from Annual Survey of Mfrs.

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Statistics *continued*

A-6 — Converted Products Share of Value

Year	Fibre Box	Folding Carton	Rigid Box	Other Converted Board Products	Total
1941	48.4	23.3	11.8	16.5	100.0%
1951	48.5	28.6	9.2	13.7	100.0
1961	44.7	23.2	5.8	26.3	100.0
1971	48.0	17.3	5.7	29.0	100.0
1972	49.2	16.5	5.4	28.9	100.0
1973	50.9	15.1	5.1	28.9	100.0
1974	51.4	14.3	4.8	29.5	100.0
1975	50.1	15.6	4.3	30.0	100.0
1976	50.2	15.4	4.3	30.1	100.0
1977	49.5	15.5	4.4	30.6	100.0
1978	49.6	15.6	4.3	30.5	100.0
1979	51.1	15.3	4.3	29.3	100.0
1980	51.3	14.8	4.2	29.7	100.0
1981	51.4	14.7	4.0	29.9	100.0

A-7 — Major Board Grade (tons)

Grades	1961		1971		1981	
Containerboard	8,656,500	47.0	14,353,000	50.6	19,040,100	52.4
Folding Boxboard	2,987,500	16.2	4,090,400	14.4	4,587,600	12.6
Set-up Boxboard	492,900	2.7	447,900	1.6	236,000	0.6
Milk/Food Board	1,523,200	8.3	1,695,300	6.0	1,392,500	3.8
Building Board	1,841,700	10.0	2,836,000	10.0	2,217,300	6.1
Cardboard	137,000	0.7	581,500	2.1	32,300	0.1
Wet Machine Board	156,400	0.8	157,000	0.6	127,000	0.3
Miscellaneous	2,645,800	14.3	4,195,297	14.7	8,731,200	24.1
Total	**18,441,000**	**100.0**	**28,356,397**	**100.0**	**36,364,000**	**100.0**

Source: Containerboard, folding rigid and special foodboards are as classified by American Paper Inst.; building board, cardboard, wet machine and total from Bureau of Census; miscellaneous is a balancing figure.

and '80 the expansion was only 8% and in these latest five years the volume has turned slowly but steadily down, until when in 1981 it had fallen at last below the tonnage of clay-coated recycled board, as consumed in folding cartons.

This must be ascribed to the widening price differential. Eight years ago, the cost difference per ton between bleached sulfate and clay-coated news was $80. As 1982 opened, the margin had doubled to $180 per ton. Even the most ardent marketer must find that an exhorbitant premium to pay for alleged aesthetics.

Table A-5—Conversion of paperboard into packaging added 69% to the value of the raw materials in 1981, compared with 102% ten years ago—an illustration of the squeeze on profits. Over that decade, the paperboard packaging industry increased its product value by 170%, while consuming 28% more material. Total converted value exceeded $19 billion for the first time, up 10% from 1980–notably below the 17% annual average for the decade, though 380% higher than 20 years ago.

Value advances of individual products, respectively for the year and the decade, were: fiber boxes, 10.4% and 189%—folding cartons, 9.4% and 129%—set-up boxes, 6.7% and 92%—other converted board products, 10% and 175%.

Table A-6—The security of corrugated containers against serious competition, and the vulnerability of other paperboard packagings to alternate forms and materials is evident in these trends. It is seen that the corrugated boxes are gradually expanding their share of total value, while the "small paper" boxes decline and their abandoned percentage points are taken over by "other" products.

Thus, for a 20-year comparison, the U.S. per capita expenditure for paperboard packaging went up from $22.15 in 1961 to $86.06 in 1981, or 288%. However, in that double-decade the average citizen's payment for fiber boxes rose by 347%, from $9.91 to $44.27, and by 340% for

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A-8 — Tons of Fibrous Raw Materials Consumed in Paper and Board

Year	Pulp	Paperstock	Other	Total
1941	11,234,600	6,772,800	1,262,500	19,269,900
1951	17,737,000	9,078,900	1,443,000	28,258,900
1961	26,683,000	9,052,000	905,000	36,640,000
1971	44,183,000	10,265,000	959,000	55,407,000
1972	47,347,000	11,703,000	910,000	59,960,000
1973	48,899,000	12,374,000	883,000	62,156,000
1974	48,517,000	12,106,000	770,000	61,393,000
1975	44,668,000	10,345,000	708,900	55,721,900
1976	46,968,000	10,167,000	760,000	57,895,000
1977	46,704,000	11,071,000	723,000	58,498,000
1978	50,114,000	13,178,000	741,000	64,033,000
1979	53,057,000	12,874,000	772,000	66,703,000
1980	52,321,000	12,620,000	761,000	65,702,000
1981	53,054,000	13,382,000	714,000	67,150,000
Fibre Distribution of Average Furnish (Selected Years)				
1941	58.3	35.2	6.6	100.0%
1951	62.8	32.1	5.1	100.0
1961	72.8	24.7	2.5	100.0
1971	79.6	18.7	1.7	100.0
1972	79.0	19.5	1.5	100.0
1973	78.7	19.9	1.4	100.0
1974	79.2	19.5	1.3	100.0
1975	80.2	18.6	1.2	100.0
1976	81.1	17.6	1.3	100.0
1977	79.8	18.9	1.3	100.0
1978	78.3	20.6	1.1	100.0
1979	79.5	19.3	1.2	100.0
1980	79.6	19.2	1.2	100.0
1981	79.0	19.9	1.1	100.0

Source: Bureau of Census

Statistics

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"other" board packagings, from $5.82 to $25.64—yet by only 146% for folding cartons, from $5.16 to $12.67, and by 172% for set-up boxes, from $1.28 to $3.48.

Table A-7—Some 2.4 million tons of nonpackaging boards—tabulated by the Bureau of Census but not by the American Paper Institute—are included in the 1981 summary. This is a reduction of one-third in ten years, led chiefly by the drop in building board tonnage because of the protracted construction slump. On the other hand, vigorous development of various specialty boards is seen in the surge of "Miscellaneous" tonnage—up 108% in the decade, and 220% since 1961.

Table A-8—Of the 11.7-million-ton increase in fibrous raw materials consumed in paper and board between 1971 and '81, some 76% was in virgin pulps. This imbalance increased in the more recent years, because of depressed pulp demand/price. Of the remaining one-quarter, reclaimed paper stocks had a fairly good year in 1981. But the use of other valuable non-wood fibers, such as cotton linters, bagasse residue from sugar cane, scrap textiles, and the like, is down by 25% in this decade, and by 50% over the past 30 years.

Fourth Straight All-Time High Reached

Wood Pulp Review and Outlook

Table B-1—An all-time high tonnage of U.S. domestic pulp production was reached in 1981, for the fourth consecutive year—up 24% since 1971, by 105% from '61 and by 230% in 30 years. Imports dropped moderately from 1980, with the reduction in U.S. paper/board production and in fact were 8% below 1974. Pulp exports, however, were down only slightly from record-high 1980—up 70% from '71 and 1700% from '51. This is not despite, but is because of, the recessive economics overseas.

B-1 — Total U.S. Pulp Production, Net Supply, Consumption & Inventories (M short tons)

Period	U.S. Produced	Imported	Exported	Net New Supply	Consumed In Board and Paper	Year End Inventory
1951	16,524	2,361	202	18,662	17,737	611
1961	26.523	2,467	1.178	27.812	26,683	798
1971	43,744	3,514	2,162	45.095	44.183	869
1972	46,604	3,728	2,253	48.079	47.347	608
1973	48.355	3.993	2.344	50,004	48,862	678
1974	48.417	4.123	2,808	49,729	48.300	931
1975	40.583	3,078	2,565	41,096	42,620	1005
1976	47,173	3.703	2.518	48,358	46,968	580
1977	46,858	3,864	2,640	48,082	46.704	555
1978	50,375	3.979	2,599	51.755	50.114	433
1979	53,225	4,382	2,791	54.816	53,057	1759
1980	53,319	4.026	3.806	53,539	52,321	446
1981	54,362	3.804	3,677	54.489	53.054	672

Source: Dept. of Commerce and API.

Foreign producers are faced with high and rising costs of raw-material retrieval and energy, far beyond those afflicting this country. As a result non-oil-producing nations in both Europe and Asia find operating expenses so high, for some products, that these can be imported from the U.S. and Canada, including ocean freight, at a markedly lower cost than they can be manufactured at home.

This is particularly true of the extensively processed materials. Thus, though the domestic production tonnage of bleached kraft pulp is lower than that of unbleached, its export is nearly ten times greater. Similar comparisons appear in trends for other grades. When exports are subtracted and imports added to 1981 domestic output, the year's new tonnage available was history's second-highest, up by 21% from 1971, by 96% from '61, and by nearly 200% from the tonnage of 30 years ago.

Table B-2—Another all-time record scored in 1981 is the exported volume of bleached kraft pulp, for the fourth consecutive year—in spite of a 185% price increase since 1971. The bleached tonnage shipped overseas is seen to be more than six times greater than that of all these other "packaging" pulps combined. Bleached kraft exports are up 130% in ten years, and 1100% in 20.

This increase is, of course, a result of skyrocketing process costs, because of energy-price escalation with its relentlessly rising expenses for dissolving and bleaching chemicals, cooking the fiber in them and drying the products.

The worldwide marketing appeal of the bleached pulp is, inevitably, the aesthetic appeal of its converted packaging products in an intensely competitive marketplace. A summary of its expansion is this: In 1971, the net new U.S. supply of bleached kraft pulp plus unbleached was 28.6 million short tons, 44% of it bleached. In 1981, this combined net supply had become 42.8 million tons, with 50.4% of it bleached. Thus, of that 14.2 million ton additional new supply, over the decade, 63% was in bleached pulp, which thereby represents more than half of the 1981 net supply—in competition with the basic unbleached material for manufacture of corrugating linerboards.

The slow decline in volume of sulfite pulps is due in part to replacement by sulfates, for some purposes, and in part to their replacement by furnishes of recycled white-papers, at lower cost. Hence, in 1961 the sulfites comprised 15% of total net supply in the basic grades tabulated here. By 1971, the share had dropped to 6%, and by '81 to 3%. Over the double-decade, sulfite pulps lost 36% of tonnage.

The market price of pulp-substitute white papers has gone up accordingly. At mid-year 1971, the mid-continent price for ordinary reclaimed News, as an example, was $20 per ton while that of Hard White Shavings was $80. By mid-1981, the News price had risen a seemingly significant 50%, to $30, but of that the pulp-substitute shavings was up more than ten times that dollar amount, to $185, or by 130%.

Table B-3 — This, in broad terms, is where the pulp went. While mill consumption trends rarely display any unusual antics beyond fluctua-

Statistics *continued*

tions in overall economy a much more active picture appears in two decades of "Third World" industrialization. Thus, exports in 1971 were 85% higher than in '61, and another 70% higher in '81 than in '71.

Paper is, of course, a highly suitable medium for beginning the establishment of self-sufficiency in those areas short of native resources. It is an uncomplicated, nonperishable, relatively inexpensive raw material that can be made into a wide variety of end-products, with readily acquired skills, in essentially simple processes. Trends in U.S. pulp export are a measure of that development.

Thus, between 1961 and '81, exports of U.S. paper pulps rose in tonnage by 212%—more than double the 101% advance in total consumption. From another standpoint—in 1961 the tonnage exported was 4% of domestic mill consumption. But of the additional tonnage consumed in 1981 over '61, some 8.6% was exported. Another note is that 1981's exports were 21% of 1951's domestic consumption. Since the "emerging nations" conditions that brought about this demand are likely to continue and to grow, the export market should remain a valuable outlet for U.S. pulps.

Continuing in 1981 is one of the most remarkably unvarying performances in any expanding industry—the motionless tonnage of paper pulp being consumed in non-paper end-uses. Over the past decade—with the single exception of depressed 1975—this annual volume has varied only fractionally, regard-

B-3 — Pulp Consumption by End-Uses (M short tons)

Year	Board & Paper Mills	Exports	Non-Paper Uses	Total
1951	17,286	2,019	714	18,653
1961	26,683	1,178	907	28,768
1971	44,183	2,175	1,116	47,474
1972	47,347	2,237	1,115	50,305
1973	48,862	2,344	1,146	52,352
1974	48,517	2,808	1,154	52,479
1975	42,620	2,565	783	45,968
1976	46,968	2,518	1,121	50,607
1977	46,704	2,640	1,097	50,441
1978	50,114	2,599	1,153	53,866
1979	53,057	2,791	1,222	57,070
1980	52,321	3,806	1,166	56,360
1981	53,054	3,677	1,137	57,868

Source. Census Bureau. U.S. Dept. of Commerce. API

B-2 — U.S. Pulp Production, Net, Supply by Principal Paper Grades (M short tons)

(Net supply equals imports plus domestic production minus exports)

	Unbleached Kraft				Bleached Kraft				Semibleached Kraft			
Year	Imported	Domestic	Exported	Net Supply	Imported	Domestic	Exported	Net Supply	Imported	Domestic	Exported	Net Supply
1951	336	6,379	71	6,643	522	2,143	96	2,705	214	699	54	859
1961	203	9,115	156	9,162	1,068	5,405	431	6,042	129	998	116	1,009
1971	294	15,826	149	15,971	2,098	11,442	894	12,646	193	1,552	119	1,626
1972	359	17,286	77	17,568	2,259	12,372	1,073	13,558	214	1,600	240	1,574
1973	368	17,580	71	17,877	2,500	13,228	1,032	14,696	189	1,826	80	1,744
1974	342	16,987	156	17,173	2,586	13,938	1,458	15,066	161	1,421	73	1,509
1975	190	15,227	96	15,301	2,132	12,756	1,379	13,509	104	1,375	87	1,384
1976	249	17,745	113	17,881	2,558	14,291	1,406	15,443	112	1,496	91	1,517
1977	245	18,399	104	18,540	2,588	14,887	1,369	16,106	138	1,538	89	1,587
1978	249	18,689	192	18,746	2,782	17,050	1,809	18,023	132	1,591	93	1,630
1979	258	19,391	199	19,450	2,935	17,987	1,908	19,014	137	1,651	97	1,691
1980	263	19,942	202	20,003	3,355	18,990	2,014	20,331	128	1,704	99	1,733
1981	305	21,133	215	21,223	3,611	20,008	2,048	21,571	119	1,816	96	1,839

	Unbleached Sulfite				Bleached Sulfite				Semichemical		
Year	Imported	Domestic	Exported	Net Supply	Imported	Domestic	Exported	Net Supply	Domestic	Exported	Net Supply
1951	557	764	43	1,279	579	2,377	75	2,881	818	n.a.	818
1961	143	567	32	687	507	2,007	118	2,396	1,921	n.a.	1,921
1971	100	368	10	458	308	1,656	203	1,761	3,539	n.a.	3,539
1972	100	333	2	431	323	1,796	227	1,892	3,761	n.a.	3,761
1973	147	373	5	515	356	1,920	293	1,983	4,009	5	4,004
1974	121	390	28	483	451	1,914	286	2,079	3,789	18	3,771
1975	60	366	23	403	299	1,659	246	1,712	3,419	9	3,410
1976	76	460	12	524	360	1,746	181	1,925	5,138	4	5,134
1977	57	413	8	462	454	1,656	192	1,918	5,327	4	5,323
1978	45	329	8	366	453	1,429	166	1,716	5,627	10	5,617
1979	39	287	7	319	396	1,248	145	1,499	6,812	12	6,800
1980	32	365	7	390	372	1,449	137	1,684	7,946	14	7,932
1981	29	349	7	371	337	1,389	122	1,604	8,401	15	8,416

Source: Bureau of Census, U.S. Department of Commerce, API. *as of Jan. 1 75, Census Bureau combines Soda data with Sulfate.

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Statistics *continued*

B-4 — Average Yearly North American Pulp Prices

(Per Short Ton)

Year	Unbleached Kraft	Bleached Softwood Kraft	Unbleached Sulphite	Bleached Sulphite	Ground-wood
1951	$169.42	$175.80	$158.77	$164.50	$102.27
1961	120.00	145.00	125.25	137.50	87.50
1971	150.00	165.00	149.00	161.00	87.50
1972	145.00	160.00	144.00	160.00	87.50
1873	180.00	192.00	170.00	187.00	102.00
1974	185.00	295.00	285.00	292.00	185.00
1975	335.00	353.00	335.00	354.00	200.00
1976	335.00	365.00	335.00	354.00	200.00
1977	335.00	365.00	335.00	354.00	200.00
1978	335.00	365.00	335.00	354.00	200.00
1979	365.00	400.00	375.00	400.00	240.00
1980	395.00	432.00	380.00	420.00	245.00
1981	425.00	465.00	385.00	440.00	250.00
1982 1st half	440.00	470.00	430.00	440.00	250.00

*Represents announced contract levels — not necessarily the actual selling price.

B-5 — Pulpwood Receipts, Consumption & Inventories (M cords)

	Receipts				
Year	Domestic	Imports	Exports	Total Net New Supply	Consumption Total
1951	25,128	2,650	13	27,765	26,522
1961	39,272	1,305	188	40,389	41,191
1971	66,918	1,565	2,141	66,342	67,157
1972	70,272	1,283	2,665	68,990	71,538
1973	73,180	1,504	3,554	71,130	73,282
1974	77,103	1,168	3,256	75,015	75,030
1975	65,456	911	3,005	65,023	65,730
1976	73,621	1,344	3,795	71,170	74,245
1977	73,130	1,620	4,239	70,511	73,015
1978	77,025	2,062	4,287	70,905	77,740
1979	79,015	2,088	4,342	76,761	79,477
1980	81,802	2,162	4,495	79,469	80,522
1981	80,464	2,111	4,231	78,344	79,797

Source: APA, Dept. of Commerce and API.
*In cord equivalents. Includes chips from residues.

less of increases in consumption elsewhere. It is evident that there are some established uses, such as molded egg-cartons, for which the cost and properties of molded pulp cannot be successfully attacked by competitive materials and at the same time the pulp cannot compete for new applications.

Table B-4—The impact of energy cost on pulp manufacture—as in other processing areas—is seen clearly in the proliferation of price increases, following the mid-1970 escalation of petroleum price.

This is in contrast with the downtrend between 1951 and '61, as improving technologies and volume economics brought about significant reductions in production cost for all pulps. Note that in all cases the ton price, even as late as 1971, is lower than that of 20 years earlier.

As an illustration: in the ten years between 1961 and '71 the ton price of unbleached kraft pulp—largest single volume grade—went up a sedate $30. In the next decade, however, the rise was nearly ten times greater.

Similar patterns appear in fortunes of the other basic pulp types listed. Thus, in the eight-year period since 1973 (when the OPEC petroleum price exploded) the ton price of unbleached kraft pulp increased by 25 times, and that of bleached kraft by 17 times, and of unbleached sulfite by 23 times, and of bleached sulfite by 11 times—more than the total rise in the previous 22 years.

From another view: The price of unbleached kraft pulp has gone up 260% in the past 30 years—and 96% of that rise has appeared in the latest eight years.

In sum: The price escalations between 1951 and '73, and the advances since then, are respectively: for unbleached kraft, 6% and 144%; for bleached kraft, 9% and 145%; for unbleached sulfite, 7% and 153%; for bleached sulfite, 14% and 135%. While temporary economics may slow the tide at times, industry projections are for further price increases averaging 10% per year through the 1980s.

Table B-5—With the 1981 economic downturn—which has continued to and beyond mid-'82—the production of pulpwood was below 1980's record high, as were cordage of imports and exports. This also reflects a loss for paper stocks and other nonwood materials.

These figures include wood residues and chips. Note that federal law prohibits export of "unfinished" timber—i.e. logs. Chips are considered a processed product, and virtually all exports are as chips.

Exports in 1951 were a mere 13,000 cords, while 2.65 million were imported, almost all from Canada. But the decade following brought to fruition major programs for expanding the trade, and by 1971 exports were a dozen times greater than in '61. By 1981, the volume had again almost doubled since '71.

Thus, the year's wood (chip) exports are up 98% in 10 years, 2200% in 20 years, and 325-fold over 30 years. This compares with a mere doubling of domestic production since 1961.

Pulpwood imports, by contrast, are in the same order of magnitude as those of three decades ago. Further, these imports are confined almost entirely to purchases by mills near our national borders. Little or no foreign logwood is carried very far inland.

Overseas Demand for Paperstock Is Encouraging

Paperstock Review

Table C-1—If all the conservation campaigns of the past 30 years had produced a 1981 fiber-recovery ratio merely equal to that of 1951, an additional 25%, or some 3.4 million

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Statistics *continued*

C-1 — Paper Stock Recovery vs. Board/Paper Consumption (M tons)

Year	Board and Paper Consumption	Mill Paperstock Receipts	Exports	Total Recovered	Paperstock Recovery Ratio
1951	30,659	9,252	206	9,458	24.1
1961	40,406	9,053	215	9,336	23.1
1971	59,177	10,967	419	10,682	18.1
1972	64,022	11,703	415	12,118	19.0
1973	67,337	12,264	683	12,947	19.2
1974	65,452	12,438	1,307	13,745	21.0
1975	55,907	10,228	861	10,904	19.5
1976	59,460	10,206	1,273	10,881	18.3
1977	65,226	10,279	1,544	10,959	16.8
1978	68,440	13,191	1,599	14,064	20.5
1979	69,919	12,985	2,139	14,245	20.4
1980	68,564	12,712	2,717	15,429	22.5
1981	69,867	13,480	2,213	15,693	22.5

Source: Bureau of Census Forest Products & Pkg. Div. BSDA

tons, would have been taken.

Total U.S. recovery volume of secondary fiber in '81 reached an all-time high for any year, up by 6% from 1980, by 23% from '71, and by 49% from '61. All of which sounds highly encouraging until it is noted that over the past three decades of our greatest national economic expansion, with the tonnage of paper/board up 128% from '51, only one-tenth of that added volume came from recycled fiber.

The quick sensitivity of reclaimed fiber supply/demand to industrial economics is well displayed in the recovery ratios of these recent years. That of 1977, for example, was very nearly at an all-time low, coming off the high inventories accumulated in depressed 1975/76. In reaction, the ratios of these later "replacement" years is at an all-time high for the decade, though well below the ratios of 27+% common in the mid-1950s.

In any case, the 1980s decade has opened with continued frustration for those elements whose efforts to expand our use of reclaimed materials have been directed toward both resource recovery and the reduction of solid waste. It is seen again that public support, however vigorous, is not enough in itself to override the economic facts that govern our basic marketplace.

Overseas demand for U.S. paper stocks is an encouraging trend. While the exported tonnage of 1981 was below the all-time record of 1980, it remains about ten times higher than that of only two decades ago. It appears that the available quality and quantity of U.S. secondary fibers may be opening a new major outlet in both developing and developed economies abroad.

The potential is difficult both to project and to set down in normal numbers. One aspect is that in the latest ten years, U.S. consumption of paper and board went up 18%, and total recovered tonnage rose 23%, while exports expanded 428%. Another is that the single-year tonnage increase between 1979 and '80 exceeded that in the 32 years between 1951 and '81. Yet another is that secondary fiber exports in 1981 had increased by 43% in four years, by 428% in 10 years, and by 930% in 20—an accelerating rate.

The informed projection of industry planners is that—assuming normal economic progress—U.S. paper stock exports by the end of this 1980s decade may well be greater than the total present recovered tonnage. It is noted that typical shipping distances in lands overseas is lower than in North America, and that durability requirements for containers are less rigid. As a result, packaging paperboards in foreign use may be produced with greater proportions of secondary fiber, at lower cost.

C-2 — Paper Stock Movements and Stocks (M short tons)

Year	Mill Receipts	Mill Consumption	Mill Inventories	Imports	Exports
1951	9,252	9,285	589	96	206
1961	9,053	9,052	562	63	215
1971	10,263	10,270	564	68	419
1972	11,703	11,647	620	88	415
1973	12,264	12,374	516	87	683
1974	12,438	12,106	848	89	1,307
1975	10,228	10,345	731	72	861
1976	10,206	10,167	770	106	1,273
1977	10,279	11,071	723	148	1,544
1978	13,191	13,178	741	127	1,599
1979	12,985	12,871	584	170	2,139
1980	12,712	12,620	818	164	2,717
1981	13,480	3,382	979	137	2,213

Source: Bureau of Census and U.S. Department of Commerce.

Also to be noted is that the paper stock mill receipts shown are for paper/board production only. The actual national recovery ratio is thus a few points higher, because of significant volumes entering non-paper uses, such as roofing materials, wallboard facings, cellulosic insulation, and the like.

Table C-2—Consumption of paper stock in U.S. paper/board mills during 1981 was up some 6% from '80—considerably more than the 1.9% rise in production. An observation by the National Association of Recycling Industries is that "Although recycled paperboard showed a consumption increase in 1981, it was not large enough to fully account for growth in demand . . . indicating that more recycled fiber than ever before is being used by the semichemical and other packaging manufacturers in combination with virgin fiber."

This cost-saving replacement of primary furnishes by recycled fiber is a laudable development of intensive research programs and provides some defense against the impact of general recession on the recycling field. Hence, the all-time high consumption in '81, despite the downturn that appeared in the year's second half. However, the latter slump has continued into second half 1982, and shows no sign of abating.

The strongest 1981 performance

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Statistics

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was in recycled News grades, up 17.7% over '80 to 2.4 million tons. This parallels the growth of domestic newsprint, of which more than 10% is now produced from secondary furnish—a proportion likely to increase as virgin-price escalates.

Deinking grades also advanced strongly, by 14.6% to 1.25 million tons—a result of strong consumer demand for tissues, toweling, printing papers and bristol.

Corrugated grades, which make up the bulk of paper stock raw materials, also moved up to 5.6 million tons, a rise of 5.9% from 1980. This reflects expanded use as a replacement for virgin pulps in containerboard furnishes.

Mixed paper stock grades suffered the greatest reduction—down 4.7% to 2.9 million tons. These grades were seriously affected by declines in demand from the construction and housing products areas, as well as by the availability of higher grades at reduced cost, during the last half of '81. Pulp substitutes had a smaller setback, posting a 0.5% drop to 1.3 million tons, because of competition from a over abundance of market pulp.

In any event, the prolonged stagnation of paper stock demand, and the minimal prices for reduced tonnages taken, have begun to affect even the most steadfast of suppliers. As dismal 1982 wears on, some of the more vulnerable firms have begun to depart the business and even some of the more substantial dealers are indicating that there must be some limit to their financial endurance. The volume of uncollected secondary fiber would seem to indicate that there are limitless supplies awaiting an upturn in business. However, the efficient organization for collecting them may by then be no longer intact.

C-3 — Consumption of Paperstock by End-Use (M short tons)

Year	Paperboard incl. Wet Machine	Paper incl. Newsprint	Construction Grades, Molded Pulp and Other	Pulp Mills	Total
1951	6,978.7	1,335.6	764.6		9,078.9
1961	6,979.0	1,176.7	896.3	n.a.	9,052.0
1971*	8,495.0	2,350.0	1,478.0	n.a.	10,270
1972*	9,080.0	2,458.0	1,593.0	n.a.	11,647
1973	8,909.3	2,608.5	856.2	n.a.	12,374
1974	8,716.3	2,644.3	745.4	n.a.	12,106
1975	7,448.4	2,172.5	147.0	n.a.	10,345
1976	7,320.2	2,135.1	711.7	n.a.	10,167
1977	7,971.0	2,324.9	775.1	n.a.	11,071
1978	9,488.0	2,767.3	922.7	n.a.	13,178
1979	9,367.0	2,802.8	701.2	n.a.	12,871
1980	9,183.3	2,748.1	688.6	n.a.	12,620
1981	9,841.7	2,945.1	595.2	n.a.	13,382

Source: Census of Manufacturers, API Capacity Report
n.a.—not available. *API Annual Capacity Survey, Nov. 1974

C-4 — Ratio of Paperstock to Total Fibrous Materials Consumed in Board & Paper Production (M short tons)

Year	Woodpulp	Paper Stock	Other Materials*	Total	Paper Stock Percent of Total
1951	17,737	7,964	813	26,514	30.0
1961	26,683	9,052	905	36,583	24.7
1971	44,183	10,265	959	54,833	18.7
1972	47,347	11,703	892	59,942	19.5
1973	48,899	12,374	883	62,156	20.0
1974	48,300	12,106	827	61,233	19.7
1975	42,620	10,345	587	53,552	19.3
1976	46,968	10,167	760	57,895	17.6
1977	46,704	11,071	627	58,402	19.0
1978	50,114	13,178	741	64,033	20.6
1979	53,057	12,871	723	66,651	19.3
1980	52,321	12,620	588	66,529	19.0
1981	53,054	13,382	1,056	67,492	19.8

Compiled from Census Bureau Reports, API.
*Linter pulp, straw bagasse, etc.

Table C-3—An increasing proportion of reclaimed fiber used in paper grades, as compared with that entering paperboards and miscellaneous materials, is seen in these long-term trends.

Since 1971, total volume consumed rose by about 30%, and by 47% since '51. But in the latter year some 14% of total went into paper products; in 1981 it had reached 22%. And, of the additional volume consumed in 1981 over '61, some 40% went into paper, rather than board.

This increase in proportion for paper types is due largely to expansion of use in recycled newsprint, to diversion into cellulosic insulation materials, and to advancing tonnages of recycled furnishes used in specialty papers for data-processing applications.

Additional consumption in new newsprint is a highly promising prospect, as exhorbitant costs of materials and labor force up production costs for virgin material. Thus, the current sale price of Canadian newsprint is $453 per short ton ($500/metric ton). By contrast, the reclaimed-news raw material for the recycled product is currently available at around $35 per ton, requiring only deinking before use in furnish—a substantial cost-margin cushion.

As a result, some integrated mills have already converted fourdriniers to newsprint production, from linerboard or other. And, of course, Garden State Paper Co. is operating two 100,000-tons/year recycling facilities in New Jersey and California, along with a similarly sized joint venture in Chicago and a 155,000-tons facility in Georgia. The raw material is abundant.

An estimated million tons per year—at more-normal rates of residential construction—is the market for cellulose insulation of shredder, fireproofed papers, chiefly news. The establishment of national quality standards is restoring the reputation of this material as a safe, low-cost

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Statistics *continued*

product of satisfactory performance and its expansion is expected.

The reduction of secondary tonnage entering into "other product" types—down 60% in ten years—is attributed largely to the success of alternate materials, such as foamed plastics, in applications previously held by molded pulps. The decline clearly would have been greater, except for rising use of paper in construction materials—as witness the minimal consumption in depressed 1975. In any case, this category of end-use accounts for less than 5% of total paper stock.

Table C-4—A long-term ratio averaging just below 20% appears to have set in as some sort of permanent fixture for the utilization of secondary fibers among our paper/board ingredients.

It does appear that, for the moment, the tonnage of consumed paper stock is holding its own with virgin pulps. Thus, the paper/board tonnage of 1981 has risen by 23%, or 12.6 million tons, above that of '71—and 30% of the added tonnage represents non-wood material. Nevertheless, it remains that if the 1981 recovery ratio had merely matched that of 30 years ago, an additional 7 million tons of paper stock would have been collected and used.

This mere maintaining of pace is less than had been intended for the campaigns and appeals toward improved resource recovery and the utilization of abundant non-tree fibers. These include the bagasse sugar-cane residues and banana stalks of tropical areas, as well as the short-fiber cotton linters, fast-growing kenaf grasses, and similar resources suited to more-northern climates.

It had been hoped that these agricultural by-products in the emerging nations would enter a developing paper industry. However, as previously noted, the move has been toward importation of U.S. secondary fibers rather than to utilization of these high-volume local materials. Again—the economic facts of life govern the marketplace.

Table C-5—These price ranges show the highs and lows, in the year ending mid-1982, for basic paper stock grades in representative areas, as reported to *Official Board Markets* by mills and dealers.

C-5 — Domestic Paperstock Price Ranges Per Ton — 1981-1982.

Based on transactions during 1981 and Jan.-June 1982*
For current prices see Official Board Markets
Mill prices F.O.B. cars or trucks. All prices in bales — bales 500. min.

	Jan. June 1981-1982 New York	Jan. June 1981-1982 Chicago	Jan. June 1981-1982 Southeast
No. 1 Mixed Paper	$5/10	$7.50/20	$10/20
No. 1 Baled News	5/9	25/35	30/40
Old Corrugated Boxes	10/15	25/50	20/55
Boxboard Clippings	20/25	25/40	20/40
White Ledger	70/85	80/110	55/70

Dbl. Ld. Kraft Corr. Clippings	East	Midwest	Southeast
Semichem .009 Medium	37.50/87.50	37.50/87.50	40/87.50
Mixed .009 Medium	32.50/82.50	32.50/82.50	35/85
Hard White Shavings	180/255	180/255	180/255
Man. Tab. Cards	220/265	220/265	220/265
White News Blanks	65/110	65/135	65/115

Source: Official Board Markets.

Evident here is the gradual fading of market demand, and thus of price, for such high-volume, formerly prominent grades as Mixed Paper, as compared with the high and rising price of high-grade pulp substitutes. The reason for both is: processing cost.

The recent years' explosion in cost of energy, credit, labor, and transport has elevated processing cost beyond the end-use value of these low-grade fibers. "Mixed" paper is just that—a heterogeneous collection of papers which, given a moderate sorting and cleaning, once provided the acceptable base for many low-grade products. But "low cost" is gone forever.

On the other hand, prices for the better qualities of generator scrap, as such needs little or no processing before pulping, have gone up in multiples.

For example, ten years ago the typical Chicago-area price for Mixed Paper was around $12 per ton, with a $77.50 range average for Hard White Shavings. At mid-1982, the Mixed value had gone down, while the Shavings were up 240%, because of their ability to replace costly virgin pulps in some uses.

This disparity can only widen as processing costs inevitably increase, along with the proliferating production of good-quality, one-use, high-volume white papers generated in the expanding data-processing technologies.

Paperboard Mill Production Up Slightly

Paperboard Mill Review

Table D-1—Production of U.S. packaging paperboards in 1981 was up 0.9% from the previous year, less than half of the 2% average annual advance in the decade, and less than one-quarter of the 4% average since 1961. The grades listed are those tabulated by the American Paper Institute and exclude non-packaging boards recognized by the Census Bureau, as listed in an earlier section.

A continuing trend is the expansion of "minority" board types, such as the recycled medium and chip/filler grades. These had been in eclipse for many years, giving way under the advance of premium kraft. Thus, the 1981 tonnage of recycled corrugating medium is up 21% in the decade, comparing well with 27% for the semi-chemical board.

This is a reflection of vastly improved technologies in processing of secondary fibers, so as to retain their qualities of strength. The now-permissible proportions of recycled fibers in linerboard and other high-quality grades would have produced only second-rate boards until very recent years. Now, the tonnage of

Statistics *continued*

reclaimed fiber entering into primary products is far higher than it ever was in the days of non-test "jute" materials.

Unfortunately, the tonnage of packaging boxboards is actually lower than that of ten years ago—the decline being in set-up and milk/food service boards. This reflects the extent to which many paperboard applications have been invaded successfully by alternate "convenience" materials such as plastic beverage containers, foamed-plastic boxes and trays, film bags, and the like.

At the same time, it is seen that much of this lost tonnage is unidentified as box material, but has reappeared in the "other category, which now very nearly approaches the total volume of boxboard. This "other" material is entering specialty applications such as shrink- and stretch-packs, composite cans and other variations on the "square box" theme, where the board consumed is not tabulated by any industry agency. Thus, this tonnage is not lost to packaging, but is simply not being identified with the basic package types.

Table D-2—The worldwide economic recession brought about the first decline in many years for U.S. paperboard exports. The total, however, was 316% above that of 20 years ago. This depicts the rising overseas demand for our raw materials, many of which can be bought abroad for less than the production cost there.

The demand is seen to vary greatly with grade. Thus, 11% of 1981's containerboard production (from table D-1) was shipped away, compared with 5% of the boxboard tonnage. In fact, the popularity of U.S. containerboards with foreign converters is coming to pose a significant effect on available domestic supply.

It will be seen that 1981 produced 14.5 million more tons of paperboard than did 1971, but 14% of that additional tonnage was exported. Over these 20 years, the gain in tonnage available to U.S. converters was 87%, while fiber box consumption, for example, rose 116%.

With this slow attrition on domestic supply, and with very little new capacity construction scheduled, the predictions of paperboard shortages in some grades, following return of economic normalcy, may prove to be well founded.

Table D-3—Between 1971 and '81, some 19.3 million additional U.S. citizens appeared on the scene. But '81 produced 5.2 million more tons of board than did '71. Each of the decade's new brethren thus had a 583-pound share of the added packagings. This provides a somewhat better perspective on the improving quality of life that does the pedantic note than per capita share was up 1.5% from 1980, and 10% higher than in '71.

Even more revealing is fluctuation over two decades, through a 23% population expansion. In the 20 years, per-capita consumption of containerboards, and hence of long-range shipping containers, shows a 78% rise. But over the same period, personal share of folding carton boards went up only 24%—about equal to the population increase—while that of milk/food service boards dropped 26% and set-up boards went down 61%. Their shares

D-1 — Paperboard Mill Production by Grades (tons)

Grades	1951	1961	1971	1979	1980	1981
Other (Jute) Liner	1,087,600	658,200	281,700	402,300	444,500	324,200
Kraft Liner	2,956,300	5,095,700	9,249,100	12,417,300	11,948,600	12,754,300
.009 Semichemical	1,380,400	2,033,500	3,580,200	4,573,600	4,398,500	4,561,200
Recycled Medium	425,600	625,800	939,500	1,202,300	1,047,199	1,140,900
Chip & Filler	358,000	258,100	302,500	229,300	231,500	259,500
Total Containerb'd	**6,207,900**	**8,661,300**	**14,353,000**	**18,824,800**	**18,070,200**	**19,040,100**
Folding Boxboard	2,341,800	2,987,500	4,090,400	4,724,700	4,494,600	4,587,600
Set-up Boxboard	681,900	496,800	447,900	306,000	241,500	236,000
Milk Food Board	810,600	1,523,200	1,695,300	1,443,900	1,421,700	1,392,500
Total Boxboard	**3,834,300**	**5,007,500**	**6,233,300**	**6,474,600**	**6,157,800**	**6,216,100**
Other	1,849,000	3,068,500	5,450,400	6,129,600	6,724,200	5,976,100
Grand Total	**11,981,200**	**16,727,300**	**26,037,000**	**31,428,900**	**30,952,300**	**31,232,200**

Source: American Paper Institute

D-2 — Paperboard Exports (tons)

Grades	1951	1961	1971	1978	1979	1980	1981
Containerboard	134,613	468,369	2,025,500	2,304,300	2,373,400	2,693,600	2,105,100
Boxboard	50,140	91,774	132,000	304,200	364,300	399,500	322,600
Building Board	24,959	21,571	65,400	53,000	52,200	56,600	47,100
Card Board	14,639	8,040	28,700	81,100	84,000	93,200	89,200
Other Paperboard	26,482	46,742	77,500	168,000	171,200	86,500	83,300
Total	**250,733**	**636,497**	**2,329,100**	**2,910,600**	**3,044,900**	**3,329,400**	**2,647,300**

Source: U.S. Dept. of Commerce BDSA

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Statistics

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were taken up by the "other" grades, up by 60% since 1961.

The "other" board tonnage appears in a variety of end-uses, among which are the rigid bases for blisterpacks, composite fiber cans, stiffener boards, partitions, and the like. This departure from the standard packaging classifications has four major effects upon the accuracy of board application records:

One is to remove these large tonnages from identification as packaging; one is to reduce the apparent consumption of boxboard in small packages; another is to assist plastics and other alternate materials to compete with paperboard packagings; and another is to reduce the apparent ability of boxboards to face competition, as compared with containerboards, which are inherently less vulnerable to replacement.

Table D-4—The grades listed are as recognized by the U.S. Bureau of Census, adjusted to American Paper Institute totals by the "other" balancing figures.

Set-up boxboards in 1981 continued their decline as a major element in the paperboard packaging field, down 65% in tonnage from 30 years ago, and now representing less than 5% of the combined folding/set-up total, compared with 20% in 1951. To some extent—though probably not a large one—this drop in tonnage is due to development of lighter, stronger boards, so that this is not a direct reading of footage.

of lighter-colored, smoother, more readily machinable boards. For example, the tonnage accorded to "clay or other coated" materials gives them a 45% share of the folding-carton total in 1981, compared with a proportion of 39% in 1971, of 23% in '61, and a mere 8% in 1951.

Table D-5—U.S. paperboard mill activity ratio in 1981—the simple proportion of actual production to total capacity projected by the API—continued at the tradional levels that were regained with some difficulty following the economic debacle of 1975.

However, mid-year 1982 finds production tonnage down nearly 9% from '81, and if this recession continues through the year, activity rate may well be back around the levels of 1976-77. This is likely to obscure, for the moment, the fact that U.S.

D-3 — Per Capita Production, Paperboard Grades

Year	Population (1,000's)	Container-board (lb)	Folding Box-board (lb)	Set-up Box-board (lb)	Milk/ Food Board (lb)	Other (lb)	Total Board (lb)
1951	154,360	80.4	30.3	8.8	10.5	24.0	154.0
1961	183,650	94.4	32.6	5.4	16.6	33.2	182.2
1971	207,006	138.7	39.5	4.3	16.4	52.7	251.6
1974	211,909	158.2	41.8	3.8	14.8	54.3	272.9
1975	213,641	136.5	36.5	2.9	13.7	41.8	231.4
1976	214,659	155.6	39.5	3.1	14.7	48.2	261.1
1977	216,383	158.7	42.0	2.8	13.7	50.4	267.7
1978	218,059	164.3	43.2	3.1	13.4	53.8	277.8
1979	220,099	171.1	42.9	2.8	13.1	55.7	285.6
1980	223,174	161.9	40.3	2.2	12.7	54.9	272.0
1981	226,292	168.3	40.5	2.1	12.3	52.8	276.0

Source: Based on American Paper Institute classifications.

D-5 — Board Mill Capacity & Utilization (tons)

Year	Capacity—American Paper Inst.	Utilized (Production)	Activity Rate	Unused—Excess Capacity
1951	12,650,200	11,049,500	87%	1,600,700
1961	18,381,600	16,727,300	91	1,654,300
1971	28,646,000	26,037,000	91	2,609,000
1975	32,951,000	24,717,300	75	8,237,700
1976	32,338,000	28,439,100	88	3,899,000
1977	32,568,000	28,953,100	89	3,974,900
1978	33,332,000	30,274,900	91	3,024,200
1979	33,559,000	31,428,900	93	2,130,100
1980	33,788,000	30,952,300	92	2,835,700
1981	34,245,000	31,232,200	91	3,012,800

Source: American Paper Institute. Capacity is obtained by dividing production by activity rate (X100).

D-4 — Folding & Set-up Boxboard Production (tons)

Grades	1951	1961	1971	1978	1979	1980	1981
Unlined Chipboard	427,700	500,300	108,100	46,700	46,900	44,900	45,800
Lined Chip	1,043,600	838,600	955,220	1,164,700	1,169,500	1,105,700	1,055,100
Patent Coated	562,400	574,700	390,330	713,100	716,000	683,200	683,500
Clay or Other Coated	204,000	693,700	1,610,270	1,983,800	1,991,900	1,996,400	2,050,600
Other Folding	444,700	380,200	830,500	636,800	800,400	664,400	752,600
Total Folding	**2,687,400**	**2,987,500**	**4,094,400**	**4,705,500**	**4,724,700**	**4,494,600**	**4,587,600**
Newslined Chip & Solid News	622,500	384,200	400,480	310,700	285,800	225,600	220,500
Other Lined & Unlined Chip	88,500	177,700	121,870	82,300	75,600	59,700	58,400
Other Set-up	-29,100	-65,100	-74,450	-60,300	-55,400	-43,800	-42,900
Total Set-up	**681,900**	**469,800**	**447,900**	**332,700**	**306,000**	**241,500**	**236,000**

Source: Grades are Bureau of Census. Totals of folding and set-up are American Paper Institute. Other folding and other set-up are balancing figures.

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Statistics *continued*

The trend continues toward use capacity for such grades as containerboards is being approached by demand.

A similar imbalance occurred during the boom of 1973, with a 97% activity rate and some unfortunate results in machine maintenance. At that time, however, a fairly substantial influx of new capacity was about to go on stream. That is not now the case. Indeed, more than one machine has recently been converted to manufacture of newsprint, as being a higher-profit product. If economic conditions return to normal within near future year, there may well be a severe shortage of U.S. capacity for some high-volume paperboard grades.

Table D-6—U.S. capacity for packaging paperboards, on basis of existing construction commitments, will expand by 1.9% between 1982 and '83, comprising a 2.4% advance for containerboard grades and 0.6% for boxboards. This is far below a typical average annual advance, and is indicative of recent years' forced revisions in capital spending.

Basic costs of construction have more than tripled in a half-dozen years, greatly exceeding improvements in price of product. Daily operating expenses are escalating similarly.. Thus far in 1982, some major forest products firms have incurred "minus" income for the first time in their history. Others are fortunate to be matching the profits of a decade ago. Expansion of mill capacity can only be among the first victims and latest recoverers.

D-6 — Future Board Capacity, Existing Commitments

(313-day basis, at year end, M tons)

	1980	1981	1982	1983
Kraft Linerboard	14,899	15,391	16,086	16,307
Comb. Linerboard (Jute)	357	404	547	560
Kraft Medium	0	0	0	0
Semichemical Medium	4,902	5,009	5,180	5,477
Other Medium	1,507	1,526	1,385	1,415
Container Chip	313	320	286	287
Total Containerboards	**21,978**	**22,650**	**23,483**	**24,046**
Bending Board	5,657	5,707	5,366	5,410
Non-Bending Board	427	427	352	362
Bleached Linerboard	137	138	108	108
Other Bleached Packaging	1,910	1,918	1,794	1,786
Other Bleached	201	206	228	230
Total Boxboards	**8,332**	**8,396**	**7,848**	**7,896**
Wallboard Facing	1,293	1,301	1,269	1,285
All Other Board	3,076	3,092	2,281	2,304
	4,369	4,393	3,550	3,589
Total Paperboard	**34,677**	**35,439**	**34,881**	**35,531**

Source: American Paper Institute, Inc.

Box Plant Production is History's Third Highest

Corrugated/Solid Fiber Review

Table E-1—Again trailing the record output of 1978 and '79, box plant production of corrugated plus solid fiber materials in 1981 (without deduction for conversion scrap) was history's third highest, up 26% in the decade, 112% in 20 years, and 224% in 30 years.

It is evident that fiber boxes have reached a saturation point in the long distance shipping container market, as alternate packagings remain unable to compete in the application. Thus, in the post-war decade of 1951-61, average annual increase was 5.3%; between '61 and '71 it had risen to 6.8%—nearing a completion of the take-over—and in 1971-'81 has settled to 2.3% for the average year, in parallel with the national growth rate.

Another indicator of this is the recent-years pattern of annual advance and retreat, closely sensitive to the economic cycle. This depicts a basically mature industry, unlikely to develop any further major expansions or contractions, but responsive to temporary peaks and dips in the overall economy.

E-1 — Annual Fibre Box Plant Production (tons & M sq ft)

Year	Corrugated		Solid Fibre		Total	
	Tons	M Sq Ft	Tons	M Sq Ft	Tons	M Sq Ft
1951	5,362,300	75,368,700	475,500	3,015,000	5,837,800	78,383,700
1961	8,093,800	118,423,000	200,100	1,296,000	8,293,900	119,719,000
1971	13,643,800	200,354,500	163,000	1,147,600	13,806,800	201,502,100
1973	16,284,500	236,918,900	161,900	1,139,300	16,446,400	238,058,200
1974	15,284,300	224,534,200	144,500	1,016,700	15,428,800	225,550,900
1975	13,860,800	203,230,200	114,600	806,600	13,975,400	204,036,800
1976	15,667,100	227,817,700	122,200	859,800	15,667,100	228,677,500
1977	16,337,200	238,800,900	126,900	893,100	16,464,100	239,694,000
1978	17,541,250	256,400,900	131,100	922,400	17,708,700	257,323,300
1979	18,159,700	261,072,000	137,400	966,600	18,159,700	270,738,000
1980	17,489,500	251,939,000	129,400	910,200	17,618,900	252,849,200
1981	17,821,200	253,032,000	119,800	842,500	17,941,000	253,874,500

Source: Fibre Box Assn. Production is at end of combiner, without deduction of box shop waste. Tons represent board consumed.

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Statistics *continued*

One more evidence of present maturity, combined with an indicator of container diversification, appears in the average weight of corrugated board per unit area. In 1951, one ton of containerboard produced 14,055 square feet of converted board. In 1971, the footage had reached 14,685 feet per ton, up 5%, as kraft and semichemical replaced the remaining use of older, heavier boards. However, in 1981 the footage per ton had dropped to 14,198 sq. ft. This reflects the rapid increase in footage of double and triple wall board, up 46% in the decade.

Table E-2—U.S. shipped footage of corrugated plus solid fiber products in 1981 was the second-highest of all time, up 10% from 1980, with corrugated forming 99.7% of the total. Shipped value set a new record, above $10 billion for the first time, with square-foot unit value also at a new high.

A measure of the prominence of these shipping containers in our economy is that this value has increased by 193% in ten years, by 464% in 20, and by 578% in 30 years. Among common commodities, only the price of petroleum matches that performance.

To be noted is that the 29% increase in shipped corrugated footage over the 1971-81 decade is only one-fifth of the increase in average-foot value. This provides the industry with an income cushion that has compensated well for the inflation rate.

This value advance has been largely in response to the escalation of energy cost that began in the early '70s. Thus, corrugated shipments increased by 54.6 billion sq ft between 1971 and '81, and an expectable 46% of that expansion appeared in the first five years of the decade. But of the $22.65 value rise per MSF over the ten years, some 60% developed in that first half, which was the period of the oil crunch.

Footage of solid fiber products is now only 0.3% of the total shipments—roughly one-fourth of the proportion in 1961 and one-tenth of that in '51. To be noted, however, is that while the footage of solid fiber has dropped by 73% over 30 years, the decline in its value had been only 18%.

Clearly, the solid-fiber materials retain some applications in which it is not satisfactorily replaced. Among these is the increasingly popular reusable slip-sheet for separating stacks of converted products on skids.

Table E-3—The expansion of U.S. per-capita box consumption, compared with its rise in population, clearly illustrates the importance and acceptance of protective shipping containers in our national economy and lifestyle.

In the 1971-81 decade, individual

E-3 — Per Capita Shipments, Corrugated & Solid Fiber

		Per Capita Consumption — Sq Ft		
Year	Midyear U.S. Population	Corrugated	Solid Fiber	Total
1941	133,060,045	364.8	22.8	387.8
1951	154,360,000	483.4	19.7	503.1
1961	183,650,000	617.3	6.5	623.8
1971	207,006,000	921.5	5.2	926.7
1974	211,909,000	1015.1	4.5	1019.6
1975	213,641,000	906.1	3.5	909.6
1976	214,659,000	1004.2	3.8	1008.0
1977	216,383,000	1046.1	3.9	1050.0
1978	218,228,000	1111.4	4.1	1115.5
1979	220,099,000	1134.5	4.3	1138.8
1980	223,174,000	1077.6	4.0	1081.6
1981	226,292,000	1084.1	3.6	1087.7

Source: Based on Fibre Box Assn. and Bureau of Census data.

E-4 — Grades of Corrugated Board Production (M sq ft)

Year	Single Face	Double Face	Double and Triple Wall	Total
1951	1,658,100	69,942,200	3,768,400	75,368,700
1961	1,725,000	110,091,000	6,607,000	118,423,000
1971	1,460,900	183,744,800	15,118,800	200,324,500
1973	1,490,000	216,841,400	20,195,800	238,527,200
1974	1,492,200	203,448,600	19,153,800	224,094,600
1975	1,165,500	186,172,400	15,892,300	203,230,200
1976	1,305,200	207,879,800	18,632,700	227,817,700
1977	1,216,500	217,183,800	20,400,600	238,800,900
1978	1,265,000	232,827,000	22,309,000	256,401,000
1979	1,166,000	236,670,000	23,236,000	261,072,000
1980	1,144,000	229,054,000	21,741,000	251,939,000
1981	1,126,000	229,808,000	22,098,000	253,032,000

Source: Fibre Box Assn.

E-2 — Corrugated & Solid Fibre Shipments (M sq ft & value)

	Total M Sq Ft			Total Value			Average Value per M Sq Ft		
Year	Corrugated	Solid Fibre	Total	Corrugated	Solid Fibre	Total	Corrugated	Solid Fibre	Total
1951	74,161,800	3,033,900	77,195,700	$1,204,475,100	$106,797,700	$1,316,272,800	$11.19	35.20	17.05
1961	113,365,100	1,196,200	114,561,300	1,777,068,100	43,021,900	1,820,090,000	15.68	35.97	15.89
1971	190,756,100	1,075,600	191,831,700	3,422,262,100	41,418,100	3,463,680,200	17.94	38.91	18.06
1973	226,984,300	1,067,900	228,052,200	4,815,486,600	46,569,700	4,862,056,300	21.22	43.61	21.32
1974	215,119,000	953,000	216,072,000	5,742,301,300	50,683,600	5,792,984,900	26.69	53.18	26.81
1975	193,573,100	756,100	194,329,200	5,578,612,500	45,152,700	5,623,765,200	28.82	59.72	28.94
1976	215,564,600	806,600	216,371,200	6,395,870,800	48,067,500	6,443,938,300	29.67	59.64	29.78
1977	226,359,700	837,800	227,197,500	6,691,170,000	50,374,100	6,741,744,100	29.56	60.37	29.67
1978	242,998,100	898,900	243,898,000	7,204,311,000	55,786,300	7,260,097,300	29.65	62.06	29.77
1979	249,701,000	942,000	250,643,000	8,344,624,600	63,269,400	8,407,894,000	33.42	67.16	33.55
1980	240,490,000	887,000	241,377,000	9,010,411,600	64,970,200	9,075,381,800	37.47	74.06	37.60
1981	245,331,000	821,000	246,152,000	9,956,771,000	62,750,200	10,019,521,200	40.59	76.43	40.70

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Statistics *continued*

box demand went up 17%, while population rose 9%. Since 1961, we have 23% more people, and 74% more boxes for each. Over the 40-year period, per capita share of the shipping containers has increased four times as fast as the number of persons—70% more people, 280% more boxes.

That, in turn, reflects the greatly improved living standards made possible by the dependable protection of consumer products in long-distance shipment.

In happy acceptance of this, the average U.S. citizen spent $44.28 for his 1981 share of fiber containers. The individual expenditure was $16.63 in 1971—$9.91 in '61, and $8.53 in '51.

It seems unlikely that very many basic commodities have attained a more-than-doubling of personal expenditure over ten years, even with all allowance for the dollar inflation, better distribution techniques, and improved marketing.

This expenditure expansion—with happy results for the box industry—counteracts the decline in birth rate of new customers—a development that has been of considerable concern to market planners. For example, between 1941 and '61 the average annual population increase was 1.9%—nearly double the 1% rate between '61 and '81. However, the individual consumption rate nearly tripled over those four decades.

Table E-4—Developments in super-high strength corrugated packagings are reflected in the expansion of double- and triple-wall board, compared with standard double-face. These heavy-duty materials comprised 8.7% of the 1981 production (before box conversion), compared with 5.5% in 1961, but their proportion of the added footage in the last 20 years has been 13% of the total.

Thus, while the double-face share in 1981 remained at 91% of total production, and was up 26% since '71, and 114% since '61, and 236% since '51—output of the heavy-duty boards rose 46% from '71, 234% from '61, and 470% from '51.

Demand for flexible single-face corrugated remains remarkably stable, in view of its chief application as a protective cushioning wrapper, considering the proliferation of novel new resilient products such as foamed plastic nodules, bubble-sheets, and the like. Single-face production in 1981 remained at around two-thirds of its volume of 40 years ago. This suggests that double-face corrugated, like the solid fiber boards, fills some applications in which it is not readily replaced, while at the same time it has little latitude for new end-uses.

E-5 — Corrugated & Solid Fiberboard Consumption (tons)

Year	Kraft & Jute Liners	.009 Corrugated Materials	Liner & Filler Chip	Total
1951	3,792,700	1,692,300	352,800	5,837,800
1961	5,544,800	2,547,800	201,300	8,293,900
1971	9,373,000	4,273,400	160,400	13,860,800
1974	10,621,200	4,746,200	61,400	15,428,800
1975	9,609,100	4,320,200	46,100	13,975,400
1976	10,782,000	4,844,400	50,700	15,677,100
1977	11,318,300	5,102,500	43,300	16,464,100
1978	12,168,400	5,494,700	45,600	17,708,700
1979	12,456,000	5,654,500	49,200	18,159,700
1980	12,018,500	5,427,400	43,600	17,489,500
1981	12,262,400	5,530,400	28,400	17,821,200

Source: Fibre Box Assn.

Table E-5—Readily calculated from this summary (and from earlier table D-1) is the extent to which non-kraft containerboards have been supplanted by primary materials. In 1951, about 30% of all boards entering into U.S. production of corrugated/solid fiber comprised the jute, chestnut, straw, and similar grades. By 1961 this had been reduced to 17%, and in 1981 was a mere 3% of total.

With this essential disappearance of the bulkier boards, the footage produced in 1981 was up 112% from '61 and 224% from '51, while board tonnage consumed was respectively 96% and 205% higher, a measure of the adoption of kraft.

A sharp revision may well be coming, however, in that abandonment of non-kraft boards. Assuming a someday return to what have been considered "normal" conditions of business, the revival will find containerboard mill capacity to be hard-pressed to meet demand. The modifications and extensions of existing facilities have been completed, to

E-6 — Fibre Box Plants, Equipment, Investment, Employees

	1951	1961	1971	1975	1976	1977	1978	1979	1980	1981	1982
Converting Plants	307	429	615	637	654	671	680	676	669	666	652
Sheet Plants	261	417	708	760	775	845	857	854	848	842	814
Total Plants	**568**	**846**	**1,323**	**1,397**	**1,429**	**1,516**	**1,537**	**1,530**	**1,517**	**1,508**	**1,466**
Dbl.-Face Corrugators Operated	408	528	647	722	744	755	768	760	754	754	747
Dbl.-Face Corrugators Total Trim	29,205"	39,167"	51,560"	58,727"	60,781"	61,774"	62,811"	62,424"	62,209"	62,175"	61,020"
Pasters Operated	42	37	32	37	37	36	36	36	34	33	32
Pasters Total Trim	3,642"	3,028"	2,634"	3,076"	3,055"	3,005"	3,005"	3,005"	2,857"	2,737"	2,654"
Total Companies	**416**	**468**	**680**	**805**	**819**	**875**	**894**	**884**	**879**	**877**	**853**
Est. Investment (MM$)	$263.0	$541.0	$922.6	$1,156.5	$1,192.6	$1,272.5	$1,334.9	$1,426.1	$1 1568.7	$1,646.5	$1,615.9
No. Employees	41,600	55,200	96,500	107,780	111,370	117,860	119,810	119,120	118,110	114,200	112,100

Source: Plant and machine data from **OFFICAL Container Directory**; investment estimated; employment from Fibre Box Assn. A converter must operate complete corrugators or pasters to be so classed; one operating only single facers is classed as a sheet plant (one who buys combined board from converters). Companies represent entities, ignoring influence of subsidiaries, affiliates or parent relationships, non-operating parent companies not counted.

Statistics *continued*

the feasible maximum. Any significant further additions to capacity must come from new construction. But little or no new installations are under way, or are likely to be soon, because of the exhorbitant cost. When an economic upturn comes, it is inevitable that primary capacity will be promptly absorbed and that available non-kraft capacity, now idle or underscheduled, will be due for reactivation.

Table E-6—Between mid-1981 and mid-'82, for the fourth consecutive year, a drop appeared in the number of operating U.S. corrugated combiner plants, sheet plants, and total companies, according to listings in our *Official Container Directory*.

Two new companies entered business, and 26 left it, for a net reduction of 24. Six additional combiner plants opened, and 20 closed, for a net loss of 14. Four new sheet plants opened, and 32 closed, for a net reduction of 28 in the total.

The rise in per-plant productivity continues, however, in 1961, the 429 active converting plants produces an average of 279 million square feet of board (before conversion). The average reached 328 million in 1971, and 389 million in '81. Thus, the average combiner plant production was up 19% in the decade, and 39% in the 20 years.

Folding Carton Production Continues Slide

Folding Carton Review

Table F-1—Folding carton production tonnage continued its decline in 1981, with a volume-consumed drop of 3.5% from record-high 1979, and a rise of only 8% from ten years earlier. In fact, the expansion has been only 15% in 20 years, and 26% in the 30 years since 1951.

This rough tonnage comparison does not, however, take into account the recent-years replacement of some heavier cartonboards by the newer, stronger lightweight materials offering greater area per ton. The extent of this replacement is not officially compiled, but might be approximated from the sequences in Table F-3.

In any event, this decline in volume for folding cartons, as well as for rigid paper set-up boxes, illustrates the success of alternate materials and packagings in replacing small paperboard boxes. For a comparison—the tonnage of board entering into corrugated container production increased 31% in the decade ending 1981, versus the 8% rise for folding cartons. In the 20 years beginning 1961, corrugated tonnage expanded by 120%, and since '51 by 232%, compared with those respective increases of 15% and 26% for cartons.

An even more dismal comparison is per-capita consumption of the cartons and the containers. Twenty years ago, the average U.S. citizen had a 94.4-pound share of the year's corrugated, and 32.6 lb. of its cartons. In 1981 his corrugated share was 168.3 lb., up 78% in the double-decade, while his carton share was 40.5 lb.—up 24% in a 24% population increase.

Table F-2—The average-ton value of folding cartons exceeded $1,000 for the first time in 1981, up by 10.6% from the previous year, by 52% from '71, and by 166% since '61, bringing shipped value to a new record also.

Proportion of scrap in conversion was again its traditional 19%, bring-

F-1 — Folding Boxboard Consumed (tons)

1967 = 100

Year	Tons	Index
1951	2,564,800	82.8
1961	2,857,700	92.2
1971	3,019,000	97.4
1972	3,117,000	100.6
1973	3,227,000	104.2
1974	3,160,000	102.0
1975	2,938,000	94.8
1976	3,200,000	103.3
1977	3,258,000	105.2
1978	3,375,000	108.9
1979	3,393,000	109.5
1980	3,311,000	106.9
1981	3,274,000	105.7

Source: Paperboard Packaging Council

F-2 — Folding Carton Shipment Value

Year	Dollars (1000)	Tons	Average Value/ Ton
1951	$774,844	2,333,900	$301.21
1961	941,870	2,314,750	406.90
1971	1,250,000	2,445,000	511.25
1972	1,330,000	2,525,000	526.73
1973	1,460,000	2,614,000	558.53
1974	1,694,980	2,531,721	669.50
1975	1,755,000	2,380,000	737.39
1976	1,979,000	2,592,000	763.50
1977	2,105,000	2,639,000	797.65
1978	2,278,000	2,734,000	833.21
1979	2,435,000	2,748,000	886.10
1980	2,620,000	2,682,000	976.88
1981	2,866,000	2,652,000	1,080.69

Source: Paperboard Packaging Council

F-3 — Grades' Share of Folding Boxboard Production (M Tons and % of Total)

Grades	1960		1970		1976		1978		1979		1980		1981	
Solid Bleached Sulfate	728	25.5%	1,144	37.2%	1,182	36.9%	1,263	37.4%	1,254	36.9%	1,236	37.4%	1,18[illegible]	36.1%
Clay-Coated	734	25.7	1,033	33.6	1,150	35.9	1,181	35.0	1,181	34.8	1,179	35.6	1,271	38.8
Kraft	226	7.9	295	9.6	332	10.4	406	12.0	433	12.8	432	13.0	390	11.9
Bending Chip	326	11.4	231	7.5	204	6.4	198	5.9	173	5.1	156	4.7	164	5.0
Laminated	206	7.2	120	3.9	102	3.2	110	3.3	126	3.7	115	3.5	103	3.2
Bleached Manila	208	7.3	114	3.7	98	3.1	90	2.7	74	2.2	71	2.1	60	1.8
Patent Coated	391	13.7	105	3.4	89	2.8	85	2.5	104	3.1	67	2.0	53	1.6
All Other	28	1.3	33	1.1	43	1.3	42	1.2	48	1.4	55	1.7		
Total	2,858	100.0	3,075	100.0	3,200	100.0	3,375	100.0	3,393	100.0	3,311	100.0	3,274	100.0

Source: Paperboard Packaging Council.

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Statistics *continued*

ing the year's box-shipments tonnage to 3.5% below all-time record '79, and only 8.5% above ten years ago.

The total value of expanded shipments is, therefore, clearly due chiefly to higher unit value, rather than to higher tonnages. Thus, shipped value in 1981 was up by 9.4% from '80, by 48% from '71, and by 260% from '61, while shipped tonnage was down 1% from '80, and up only 8.5% from '61 and 13.6% from '51.

In fact, some measure of the relentless inflation during the 1970s decade may be observed in that the dollar-rise of average-ton folding carton shipments between 1971 and '81 was nearly six times that between '61 and '71, and between '51 and '61. During each of those earlier decades the price rise was a sedate $105 per average ton. In the latest ten years it has been $569.

Table F-3 The response of carton designers to successful challenge by alternate packagings may be deduced from the advances of recent years in consumption of highest quality cartonboards. Solid bleached sulfate and clay-coated materials in 1981 held a combined 75% of total production, with the proportion of either half-again greater than that of all other boards combined.

F-4 — Folding Carton Employees & Plant Investment

Year	Estimated Number of Employees	Estimated Capital Investment
1951	45,200	$120,000,000
1961	56,800	365,900,000
1971	73,400	669,900,000
1972	74,350	730,191,000
1973	75,820	763,237,000
1974	77,140	797,395,000
1975	78,120	852,322,000
1976	80,100	874,417,000
1977	80,600	944,352,000
1978	80,900	996,291,000
1979	79,400	1,012,350,000
1980	78,100	1,029,450,000
1981	75,600	1,046,978,000

However, since this resort to higher use of "visual appeal" boards has been less than successful in reversing the relative drop in demand for folding cartons, it is possible that a trend has appeared toward greater use of the less costly boards.

For example, in the cheap materials, cheap energy 1960s decade, the use of clay-coated boards went up 41%, while that of the lowly patent-coated dropped 73%, and laminated boards fell off 42%. The internationally beloved, premium solid bleached sulfate increased by 57% in consumed volume during the '60s, but in this latest decade the expansion has totaled only 3%—less than half of the overall increase in board output. So that, in 1981 the tonnage of clay coated boards exceeded that of bleached sulfate for the first time in 20 years.

This is not to be wondered at. In 1961 the price differential between solid bleached and clay-coated was $35. In 1971 the margin was $62. It now has reached $160—and the differential with white patent-coated is $260.

Cost differences of that magnitude are certain to influence boxmakers in evaluating the sales advantage of visual appeal in their products.

Table F-4—U.S. folding carton plants in 1981 employed around 2500 fewer people than in '80—and 5300 fewer than in peak 1978—because of the continuing shut-down of marginal plants. Total investment went up less than 2%, including write-off from the closed facilities. Investment per employee was an estimated $13,800—up 51% from $9,125 in 1971. The average U.S. citizen spent $12.76 for folding cartons in 1981, up 111% from $6.04 in 1971. The average 1981 industry employee, including office personnel, represented $37,900 worth of carton shipments, up 122% from $17,030 in 1971.

Table F-5—The number of producing carton plants decreased in 1981 for the fifth consecutive year, and of operating companies for the sixth, according to our *Official Container Directory*. No new companies came upon the scene, and 16 left it. No new plants opened, and 17 closed. The reduction in plant numbers is compensated somewhat by an increase in average converting capacity. At mid-1982 the carton industry's cutting/creasing capacity—a measure of carton operations size—had reached 44.8 million square inches per hour per average plant—some 77% higher than a decade ago. During the same ten years, investment per average plant went up 50% and the value of its shipments by 103%.

Composite Can Value Rise Below Annual Average

Composite Can/Tube/Core Review

Table G-1—Bare percentage increases in volume and value may be misleading in assessing the progress of a product. A relatively moderate annual expansion may—and in the case of composite fiber cans does—denote a virtual takeover of the market for a worthwhile sector of high volume end-uses.

F-5 — Folding Carton Plants, Machines & Capacity

	1951	1961	1971	1977	1978	1979	1980	1981	1982
Plants	558	606	660	752	743	737	723	711	691
Companies	455	471	449	530	527	517	508	501	485
No. Platen Cutters & Creasers	1,601	1,498	1,418	1,504	1,514	1,519	1,521	1,502	1,488
No. Cylinder Cutters and Creasers	1,723	2,126	2,253	2,444	2,441	2,442	2,439	2,440	2,432
No. Blankers — Web fed	—	218	254	340	339	335	330	319	313
No. Blankers — Sheet fed	—	49	353	549	565	590	608	602	574
MM sq in./hr Capacity	8,543.6	12,146.4	16,751.2	27,671.0	29,543.0	31,167.9	31,250.8	31,320.6	30,959.9
MM sq in. Capacity/hr/plant	14.53	20.04	25.30	36.80	39.76	42.29	43.22	44.05	44.80

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Statistics *continued*

For that reason, the 9.3% value rise in 1981 from '80 for composite cans and related products appears significantly below the annual average of a 136% rise since 1971, and of 500% since '61, though in itself it compares favorably with the advances in other packaging areas.

One factor in the moderated expansions of recent years is the nearly complete takeover from metals in such high-volume end-uses as the one-quart motor oil cans and those for citrus-juice concentrates, which are produced in billions per year.

Two other factors affect the expansion of recorded composite can sales. One is that the manufacture of these cans for self-use by the producer, in "captive" plants, amounts to around 10% of these totals shown, but is not reported to the Composite Can and Tube Institute. Another is that the annual value of composite cans for use as military ammunition containers also is not included here. In any case, the future of composite fiber cans can only be expansion.

The recycled fiber raw materials are inexpensive, compared with petroleum-based plastics, with far higher resistance to stresses from within and without, and with equivalent resistance to entry or exit of moisture, gases and odors. Their versatility in competing with wood and metal for diverse applications is well demonstrated. Composite cans are even into such unexpected applications as the food and wearing-apparel areas. An example of the latter area is the combination "panty hose" garment that has all but eliminated separate stockings from the hosiery field, and in the packaging of which composite cans have advanced widely. In the foods area, an illustration is the prompt success of a stacked potato chip novelty in a protective can that prevents crushing, while providing as much compact capacity as a bulky plastic sack.

Products "other than cans" include a diverse variety of commodities, of which a high-volume example is the textile industry's applications for spools, reels, bobbins, mandrels and the like—now almost completely taken over by fiber composites. Research has provided these with crush resistance equivalent to steel, at operating accuracies within thousandths of a inch, with much lower dimensional change in temperature variations and, again, at lower cost. These improved composites, overall, have presented the greatest range of characteristics to be found in the fiber products sector.

G-1 — Composite Can, Tube and Core Commercial Production

(Millions of dollars, captive production not included)

Estimates by Composite Can and Tube Institute, Washington, D.C.

Year	All Products	Composite Cans	Products other than Cans*
1951	121.5	63.9	57.6
1961	169.3	90.1	79.2
1971	431.3	226.4	204.9
1972	465.5	246.4	219.1
1973	502.2	280.6	221.6
1974	560.4	332.8	227.6
1975	644.3	387.8	256.5
1976	727.5	421.8	305.7
1977	783.3	449.5	334.3
1978	840.4	474.2	366.2
1979	900.0	488.8	411.2
1980	934.1	514.4	419.7
1981	1,021.0	555.3	465.7

Includes tubes, cores and miscellaneous specialties.

Fiber Drum Gains Bring Value Up

Fiber Drum Review

H-1 — Growth of the Drum Industry

Year	Estimated Million Drums	Estimated Average Price per drum	Estimated Dollar Equivalent
1951	23.6	$1.98	46,728,000
1961	31.5	2.25	70,875,000
1971	43.4	2.56	111,000,000
1972	48.1	2.72	130,832,000
1973	50.9	2.83	143,915,000
1974	56.8	2.94	167,149,000
1975	46.6	2.96	137,936,000
1976	50.7	3.17	160,719,000
1977	54.6	3.41	186,190,000
1978	59.0	3.83	226,074,000
1979	64.0	4.21	269,440,000
1980	69.4	4.80	333,120,000
1981	72.9	5.33	388,557,000

Table H-1—Estimated gains over 1980 in both fiber drum production (+5%) and unit value (+11%) brought the 1981 total dollar value up 16.6%—a worthwhile gain, though below the annual average in an increase of 250% since 1971, of 448% since '61 and of 730% since '51.

More than 80% of the decade's advance in total sales value appeared during the second half—since 1976—reflecting the increased scope and volume of end-use applications developed through continuing research in design. The incorporation of special liners, coatings, closures and other details has produced a reusable package unmatched in versatility.

High strength is coupled with great corrosion resistance, non-reactive containing surfaces. Impermeability to moisture, gases and odors, together with cost lower than comparable metal containers, is a much wider range of feasible sizes.

The estimated 72.9 million fiber drums produced in 1981—up 63% from '71—thus provided safe transport not only for ordinary bulk cargoes but for explosives, inflammables, toxics and other hazardous and perishable materials.

Fiber drums, uniquely among major packaging forms, are not represented by a trade association and precise figures on production and end-use are not compiled by any single agency. However, an informed projection of current broad-application categories is: chemicals, 41%—foods and related products, 18%—raw plastic resins, 15%—pharmaceuticals, 8%—detergents

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Statistics *continued*

and soaps, 7%—abrasives, metal powders, and machine parts, 5%—rolled materials such as films, 2%—all other products and materials, 4%.

I-1 — Rigid Box Industry Sales

(Percentage distribution by end use)

	1961	1971	1980
Textiles, Apparel & Hosiery	21.50	17.86	4.4%
Department Stores & Specialty Shops	11.40	13.33	6.8
Cosmetics & Soap	6.05	7.52	5.5
Confections	10.55	5.52	12.6
Stationary & Office Supplies	6.93	7.22	13.5
Jewelry & Silverware	6.14	4.23	9.3
Photographic Products & Supplies	4.90	1.67	4.5
Shoes & Leather	2.59	4.51	0.3
Drugs, Chemicals & Pharmaceuticals	3.96	5.10	7.5
Toys & Games	3.02	6.04	1.4
Hardware & Household Supplies	2.75	4.89	5.5
Food & Beverages	1.34	1.39	4.3
Sporting Goods	1.03	2.17	1.2
Others & Misc. Customers	17.84	18.55	24.2

Highest Box Sales Combine With Lowest Consumption

Rigid Box Review

Table I-1 and I-2—The highest set-up box sales value in history was combined, during 1981, with the lowest consumption of paperboards—down 52% in 20 years (from previous Table D-1).

Clearly, value per average ton of shipped boxes was at an all-time high. While the National Paperbox & Packaging Association does not compile tonnage of shipments, a ballpark estimate of conversion scrap might be the traditional 19% for folding cartons. If so, then rigid box shipments resulting from the 236,000 tons of paperboards consumed would be some 191,200 tons in 1981. In that case, the average value per ton of finished boxes would be some $4120—nearly four times that of folding cartons (from previous Table F-2), and up 240% in ten years.

This rate of return was achieved by diligent and successful innovation, offering a widening diversity of package styles in areas where aesthetic appeal is an effective sales tool. Few package forms have had 75% of the highest single market application taken over by competition in less than a decade (end-use proportions for 1981 were not available at the time of writing). Still fewer could have expanded the total industry sales value during the process.

One reason for this vitality is the increasing economic strength of surviving producers. About 20 years ago, some 800 separate U.S. rigid-box plants were listed by our *Official Container Directory*. Now, these have been consolidated into a total of 350 production facilities, who thus inherit a broader consumer-unit base for their advanced techniques and equipment. The smaller "mom and dad" box plants, inclined to settle quietly for local business only, have either discontinued operations or merged into larger, more-diverse, better-financed units.

At the same time, a great majority of U.S. set-up box plants are independently owned and operated, compared with the folding carton and corrugated areas, where about 70% and 85%, respectively, of the total conversion is performed by integrated firms. As a result, the typical rigid-box facility can offer personalized service not matched elsewhere in the paperboard packaging industry.

I-2—Annual Dollar Sales

Year	Dollar Sales (in millions)	Year to Year (% change)
1960	302.7	+ 0.7
1961	298.2	− 1.5
1962	309.5	+ 3.8
1963	314.8	+ 1.7
1964	322.3	+ 2.4
1965	347.3	+ 7.8
1966	385.7	+ 11.0
1967	394.9	+ 2.4
1968	421.8	+ 6.8
1969	436.5	+ 3.5
1970	433.9	− 0.6
1971	411.4	− 5.2
1972	437.7	+ 6.4
1973	485.0	+ 10.8
1974	536.9	+ 10.7
1975	483.2	− 10.0
1976	556.1	+ 15.5
1977	602.3	+ 8.3
1978	653.0	+ 8.4
1979	707.9	+ 8.4
1980	738.3	+ 4.3
1981	787.8	+ 6.7

The recent-years reduction in board tonnage consumed may be attributed largely to a wider influx of accessory materials, such as plastic inserts and attachments, lightweight paperboards, E-flute corrugated and others. These, in turn, have helped offset increased costs of making and shipping the low-density set-up box products.

The sequence of end-uses in Table H-1 was originally tabulated in order of highest to lowest percentage of sales. It now bears little resemblance to that order, but new applications have been developed, as others faded. ☐

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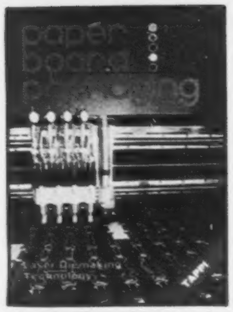

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Some of the latest processes in laser diemaking technology are examined in this month's issue. Cover photograph courtesy of Lasercomb, America, Inc.

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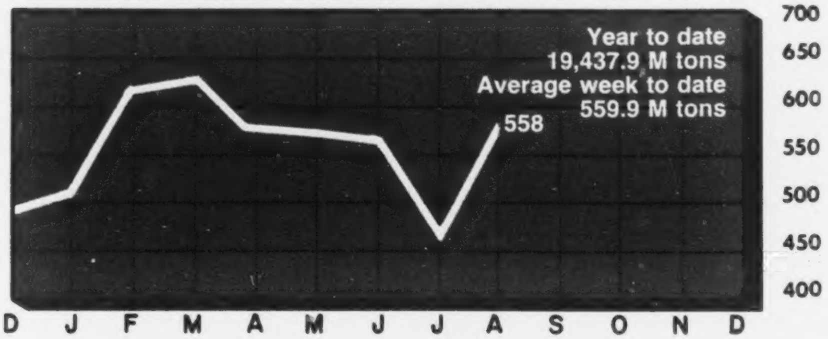
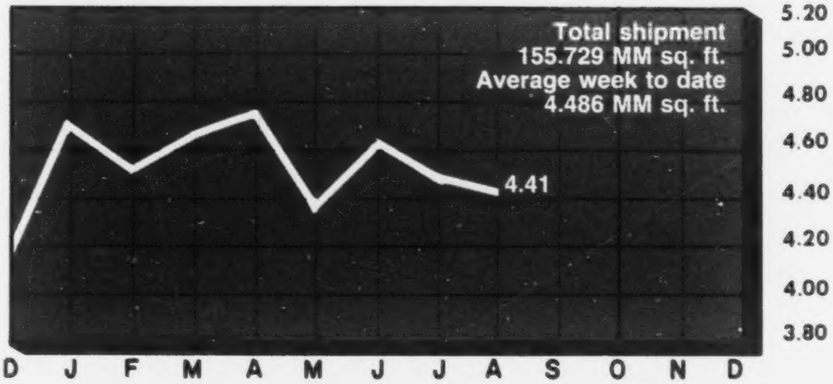
PAPERBOARD PRODUCTION 1982 - WEEKLY AVERAGE 1,000 Tons



PAPERBOARD MILL OPERATIONS:

The first two-thirds of 1982 ended with an average-week board output 9.8% below the previous year's level, compared with a rise of 3.8% in 1981 from 1980, and a drop of 0.7% in 1980 from 1979, and a rise of 3.1% in 1979 over 1978 and a drop of 3.1% in the latter from 1977. In short, this trend illustrates the "averaging out" of industry expansion: a year or two of industry growth followed by one or two of increase, and now and then an "average" compensating year. However, dropping output margins from 1981 suggest that the weakness will continue, at least through 1982.

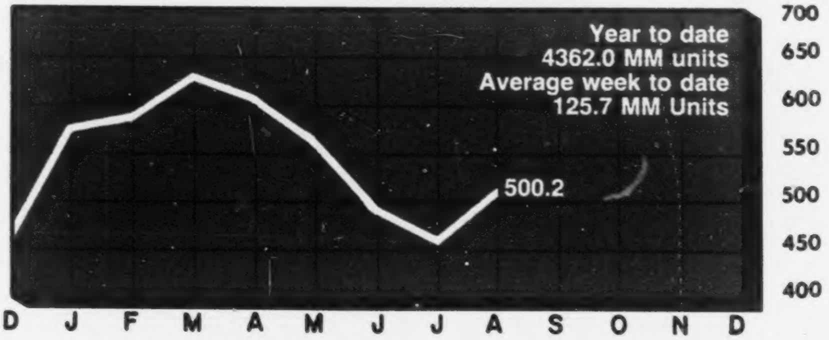
FIBRE BOX SHIPMENTS 1982 - WEEKLY AVERAGE Billion Sq. Ft.



PAPERBOARD-TYPE PRODUCTION:

In August, total board volume of 2470.1 M tons—down 9.3% from 1980—comprised 1794.1 M of containerboards—down 9.3%—and 676.0 M of boxboards—6.8% down, as projected on historical basis from the American Paper Institute's "production by furnish" reports. This depicts the relative resurgence of recycled boards against the accelerating cost of virgin pulps. Thus, in three months preceeding August, volume of recycled pulp was only 2% down from 1981, compared with -6% for the solid bleached board. Also seen is the "cooling off" of containerboard output, as the "strong dollar" stagnates exports.

COMPOSITE CAN OUTPUT 1982 - WEEKLY AVERAGE Million Units



RIGID PAPER BOXES:

A satisfactory performance during the early months of this recession, which began with the 1981 fourth quarter, has been followed by a sharp decline in set-up box business. In the first half of that period, rigid box billings were some 7% ahead of the previous year—enough to compensate for inflation, at least. During this latest half, however, national billings have been down 13% down. Only two of the Association's regional divisions are ahead of last year's business, entering this final third of 1982, and local elements in some regional sectors are reporting drops of more than 75%.

The 1980s should see continual, albeit limited, growth in the paper and board industry.

Outlook for Paper and Board Markets

By Eric Ehrnrooth
President
Jaakko Poyry International Oy

The structure of the world paper and board industry changed considerably in the 1970s:

- A total of 945 new paper machines were installed with a combined capacity of 41.7 million tons
- 1,421 paper machines were rebuilt, increasing their capacity by 20.2 million tons, and
- A total of 2,195 paper machines with a combined capacity of 16.7 million tons were shut down.

After these structural changes there are now 9,120 paper machines in operation in the world, excluding China. They have an average capacity of 21,500 tons a year and an average age of 30 years.

The demand forecasts made in the 1970s have proven to be out of scale. All forecasting institutions, including FAO and ourselves, projected steady growth of world demand at about five percent, or eight or nine million tons a year. Today we all agree that the growth will be considerably less, perhaps 3 to 3.5 percent or six million tons a year, and even these forecasts are made with the reservation that nothing like the oil crisis will happen again.

Today the market situation is once again very uncertain. The trends given here are longer term trends and they may differ somewhat from the bleak outlook for the coming months. Projections are based on the extensive data banks and forecasting models of Jaakko Poyry International and on personal experience and assessments of market conditions around the world.

Eric Ehrnrooth's paper, from which this article is edited, was read at a meeting arranged by Iggesunds Bruk AB in Gothenburg earlier this year.

Eric Ehrnrooth joined the Jaakko Poyry organization in 1959 and has since then held various managerial positions within the company; presently he is president of Jaakko Poyry-International Oy.

Changes in paper and paperboard production capacity in the 1970's

	Number of operating machines	Capacity of operating machines
Paper machines of the world 1981	9120	195.9 mill. T.
Shutdowns 1971-80	2195	16.7 mill. T.
Major rebuilds 1971-80	1421	20.2 mill. T.
New machines 1971-80	945	41.7 mill. T.

Growth to continue

In general, paper and paperboard consumption in a specific country or region is closely related to population and national incomes. Thus, Gross National Product per capita explains very well the per capita level of paper and paperboard consumption. The only clear exceptions from this formula seem to be the Soviet Union and Eastern Europe. There, paper consumption is clearly lower than indicated by GNP. This is because consumption in these areas is regulated by other than market forces. It seems that the paperboard industry in the Soviet Union and Eastern Europe is not likely to be given much more priority in the 1980s. This means that the development of the paper and board industry will be slower and fewer new paper machines will be installed that we expected a few years ago.

The key area in making paper demand forecasts worldwide is the U.S. The main question in the U.S. is whether paper demand can and will still grow from the present level of 275 kilos per capita. According to our forecast, it will continue growing in the 1980s, but in the 1990s the consumption growth will stop at about 340 kilos per capita. This level will hardly be reached in any other region.

In developing countries, especially in Asia and Africa, consumption is very low, and the growth of demand is directly related to economic growth and stability.

In 1980 about 190 million tons of paper and paperboard were consumed in the world. Consumption is expected to grow at an average rate of 3.3 percent a year, which is somewhat faster than in the years following the world economic crisis. In absolute terms, the annual growth

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continued

will be about six million tons.

The growth rates will be fastest in the developing countries, especially in Southeast Asia and Latin America, where the growth rates are still about six to seven percent a year. In volume terms the growth in the 1980s will still be greatest in North America and Western Europe.

The structure of paper and paperboard consumption will continue to change in the world. By main grade group the growth rates will be:

-3.3 percent a year for industrial grades (including tissue)
-4.0 percent a year for printing and writing papers
-2.4 percent a year for newsprint.

The following paper and board grades are growing faster than average: printing and writing papers, especially coated grades, tissue paper, linerboard and fluting.

Grades growing slower than average are: newsprint, cartonboards, sack paper, bag, wrapping and other kraft papers.

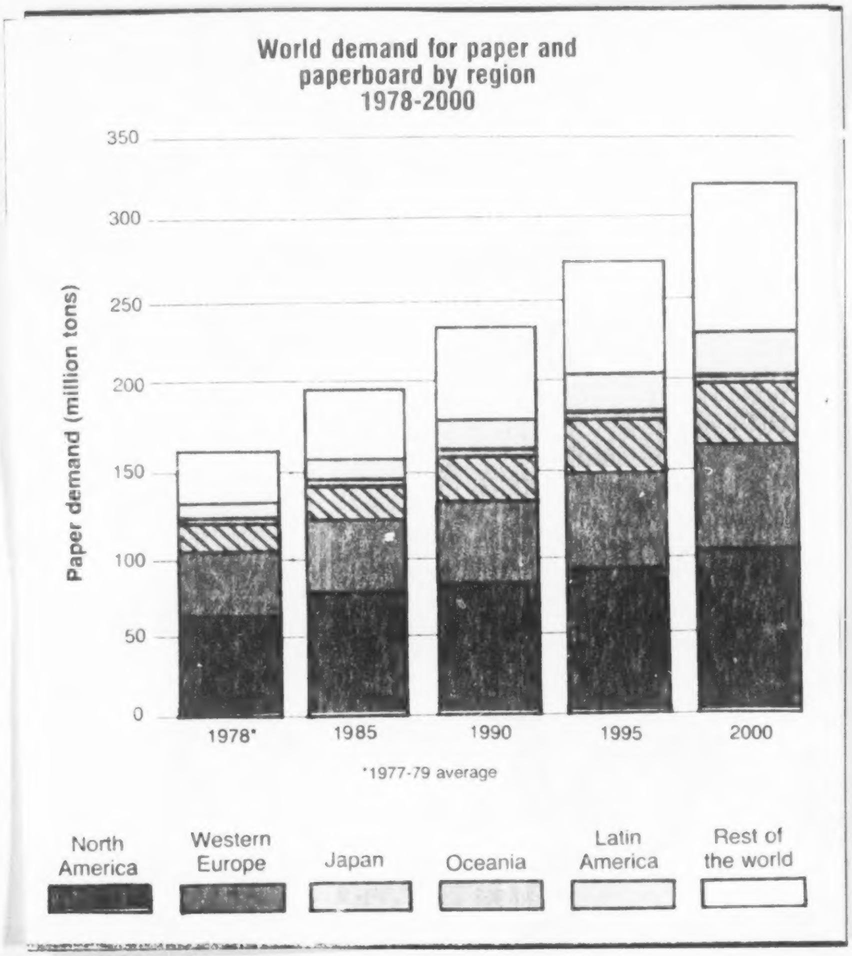
Increases needed

The world production of paper and paperboard has grown from 127 million tons in 1970 to 161 million tons in 1978 and to about 190 million tons in 1980. This gives an average growth of three percent a year during the 1970s.

North America is the biggest producer, accounting for 42 percent of the world production. Other significant producers are Western Europe (25 percent), Japan (10 percent) and the Soviet Union/Eastern Europe (nine percent). The other regions produce less than four per cent each.

To meet the growing demand, the production capacity for paper and paperboard would have to grow from 200 million tons in 1980 to about 260 million tons in 1990. This is an average increase of six million tons a year, which still is a fairly high figure.

In the 1980s North America is expected to remain the most important supplier of newsprint and industrial papers and paperboards, which are based on fiber pulp. Western European producers are expected to export increasing quantities of printing and writing papers to overseas markets, especially to developing countries. Oceania will be able to export major quantities of paper and board grades in the long run. South America, mainly Brazil, will also have some exportable surplus in woodfree printing and writing papers in the 1980s.



World demand for paper and paperboard by region 1978-2000

*1977-79 average

The developing countries together account for 11 percent, or 18 million tons, of the world production. Their share is expected to increase to 18 percent by 1990, but it will not cover the increasing demand. Despite their rich raw material resources, the production of paper and paperboard in the developing countries may increase slower than expected because of problems in financing and in the transfer of technology and knowhow.

In general, paper and paperboard consumption in a specific country or region is closely related to population and national incomes.

The share of the Soviet Union and Eastern Europe in the world's production of paper and paperboard is expected to increase somewhat from the present level of nine percent. The production increase, however, depends to a great extent on the priority given to the pulp and paper industry in these countries' development plans.

Cartonboard markets

In this context the term cartonboard covers the following board grades:

- bleached solid board,
- folding boxboard,
- white-lined chipboard,
- liquid packaging board,
- chipboard and
- mechanical woodpulp boards.

In the late 1970s the world consumption of the above cartonboard grades was 20.3 million tons. North America accounted for 42 percent and Western Europe for 24 percent of the consumption.

During the 1970s the consumption of cartonboards grew slower than the average consumption of paper and paperboard in industrialized coun-

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continued

tries. This trend is expected to continue in the 1980s, although there will be great variations between different cartonboard grades.

The demand for cartonboards will grow because of the increasing number of self-service stores, the general rationalization of distribution systems and greater packaging requirements. On the other hand, the desire to reduce packaging distribution costs will limit the growth potential. By 1985 the global demand for cartonboards is expected to reach 24.6 million tons and by 1990, 28.2 million tons. This means a growth rate of 2.8 percent a year, which is 0.5 percent a year less than for paper and board on the average. The growth rate will be lowest in North America at 0.8 per cent a year and highest in Latin America at 6.9 per cent a year.

Today we agree that the growth will be considerably less, perhaps 3 to 3.5 percent or six million tons a year, and even these forecasts are made with the reservation that nothing like the oil crisis will happen again.

North America and Western Europe are the main paperboard producing areas, accounting for practically all of the world export trade. Already decided and likely expansions—new machines and rebuilds as well as shut-downs—will increase the world production of cartonboards to about 23.3 million tons by 1985, which means that the current oversupply would be absorbed by that time. The only area with marginal export capacity in 1985 would be North America.

In 1980 cartonboard consumption in Western Europe was about 4.8 million tons. This was divided by grade in the following ways:

	(in tons)
woodpulp board	370,000
chipboards, made mainly from wastepaper	1,200,000
liquid packaging boards	550,000
white-lined shipboard	300,000
folding boxboard	1,100,000
bleached solid boards	210,000

Woodpulp board and chipboard are low quality old-fashioned products that are losing importance and show little, if any, growth. Demand for liquid packaging boards—mainly Tetra Pack and Pure Pack—has until now been growing favorably, but recently the growth rate has levelled in Western Europe.

Solid, paperboard increase

The shares of bleached solid board and folding paperboard of total consumption have increased. Large investments in folding paperboard in Sweden, the Netherlands and the United Kingdom in the second half of the 1970s resulted in overcapacity and relatively low prices. Partly for these reasons, folding paperboard gained market shares from the normally cheaper white-lined chipboard. White-lined chipboard has lost some markets contrary to pre-

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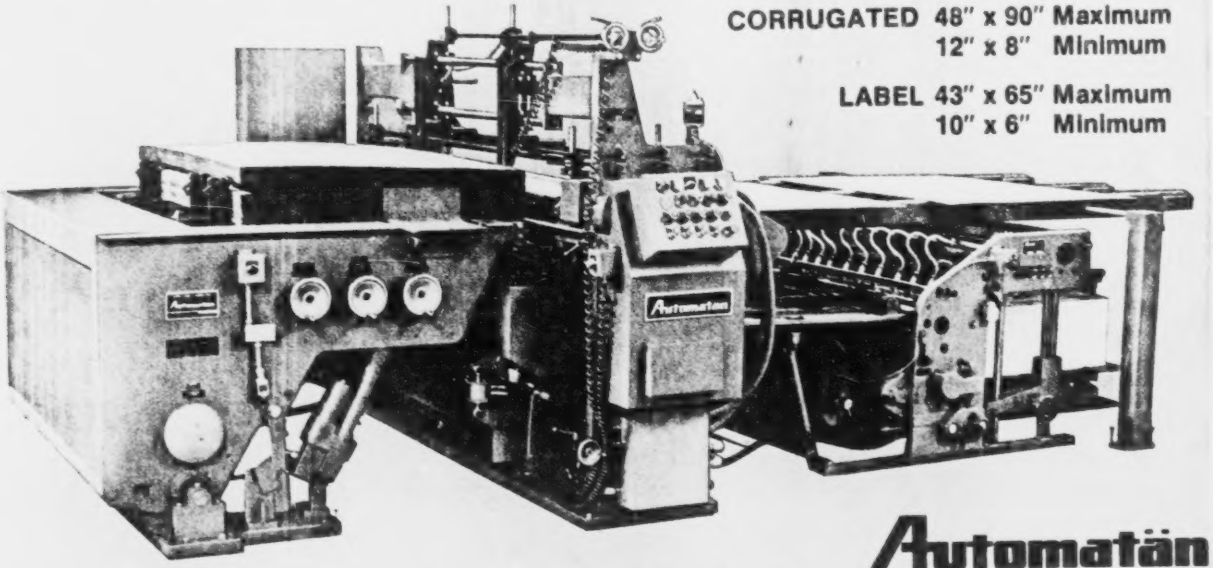

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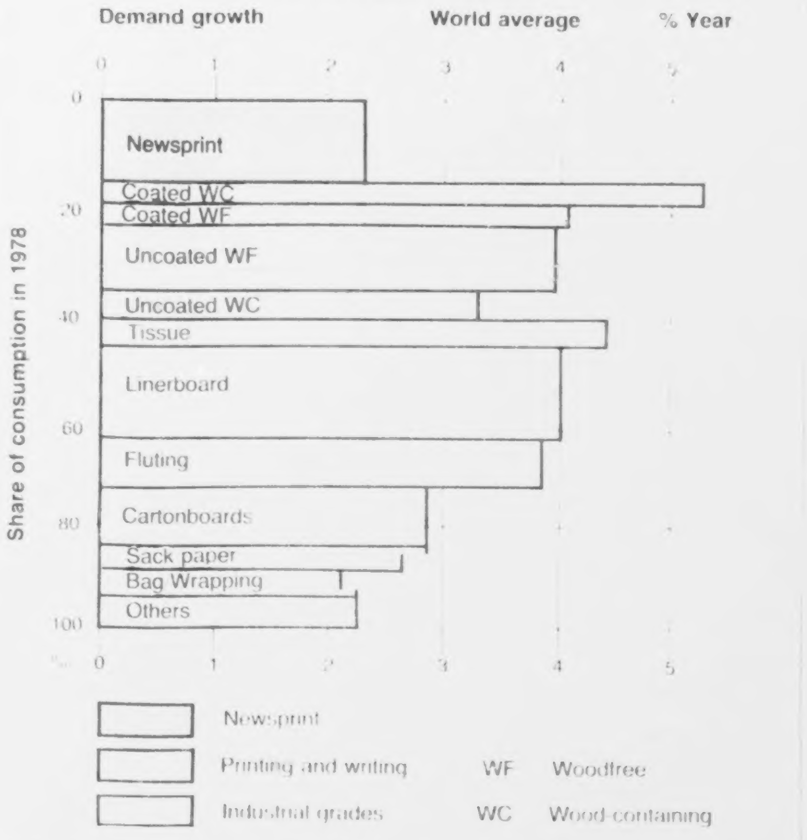

Growth rates of world paper demand by grades in 1978-95

vious expectations. This is due to overcapacity in the folding paperboard industry.

Bleached solid board has a specialized but limited market. The growth of consumption and market share is related to the increasing use of high quality packaging and graphic products.

Western Europe, Scandinavia, Switzerland, Benelux and the United Kingdom are used to the higher quality solid board and folding paperboard. The share of white-lined chipboard is highest in West Germany, Austria, Spain and Greece.

The consumption of all papers and boards as well as that of cartonboards depends very much on the income level in a given country. Western Europe, the Netherlands, Finland, the United Kingdom and Ireland are large per capita consumers. This is most likely due to the export-oriented end-use industries.

Up to 1990, we expect the demand for solid bleached board to grow fastest, at about 4.3 percent a year, followed by whitelined chipboard at 2.5 percent a year and folding paperboard at 2.4 percent a year. Other grades will grow at a considerably slower rate. By 1990 both bleached solid board and white-lined chipboard will gain growing market shares.

(Paper demand in the U.S.) will continue growing in the 1980s, but in the 1990s the consumption growth will stop at about 340 kilos per capita.

Exports marginal

The main producers of cartonboards in Western Europe are West Germany, Italy, Sweden and Finland, which account for 62 percent of the Western European production. The production of folding paperboard is consent-rated in Sweden, Finland, Italy, France and West Germany. In white-lined chipboard, the leading producers are West Germany, Italy, Austria, Spain, France and the United Kingdom. By far the largest producer of bleached solid boards is Sweden, followed by Finland.

Western Europe was a net exporter of all cartonboard grades throughout the 1970s. In solid bleached boards the net exports have been only marginal.

In the past few years about 500,000 tons of folding paperboard and white-lined chipboard have been exported annually to the Soviet Union, Eastern Europe, the Near and Middle East and Africa. These exports have been growing very rapidly during the past three years. Western Europe is expected to remain a net exporter of all cartonboard grades in the 1980s.

The North American suppliers will have limited influence on the Western European cartonboard market except in bleached solid boards during the 1980s. The folding paperboard and white-lined chipboard industries in Western Europe typically have a large number of medium and small size mills and machines. In the folding paperboard industry the structural changes began with the large scale investments in Sweden, the United Kingdom and the Netherlands. These machines distorted the market so that within a few years similar new machines are not likely to be built before smaller producers have disappeared.

In the white-lined chipboard industry restructuring has not yet started, but all indications are that such a process will start in the first half of the 1980s.

Costs dictate

Apart from the capital costs, the wood costs dominate the production costs of bleached board. This means that the wood price together with transport and distribution costs very much dictate the cost competiveness of industry suppliers, because the other cost components, such as energy, chemicals, labor etc. in a modern mill do not differ so much by supply region.

Wood costs per ton in Scandinavia are about double the wood cost in the southern U.S. or any other low work cost area, e.g. Brazil. The

Board Industry

continued

transport cost advantage of a Scandinavian mill is almost enough to compensate for the difference when compared with the southern U.S.. In Brazil, or in any new area in the developing countries, the capital costs usually are so high that the wood cost advantage is not enough to keep the mill competitive.

Cartonboard prices have been relatively low compared with the cost developments during the past few years primarily due to over-capacity in practically all grades. The overcapacity is expected to disappear by 1985. This means that the price increases are not expected to exceed inflation in the near future.

Even if a Scandinavian supplier costwise is more or less in the same position as a U.S. South supplier, the real competitive power is measured in the market place. And there the decisive factors are:

—Connections to the client and the ability to understand his problems and needs

—Superior and even quality

—Good and fast service

—Product differentiation and a good image.

Greater risk

The likely trends in the Western European cartonboard markets and industry can be summarized as follows:

- The growth rate of total demand for cartonboards will remain lower than that for total paper and paperboard on the average.

The growth rates will be fastest in the developing countries, especially in Southeast Asia and South America, where the growth rates are still about six to seven percent a year.

- Among cartonboards, bleached solid boards are projected to show the highest growth rate. The growth prospects for liquid packaging boards, low quality chipboards and woodpulp boards are foreseen to be marginal.
- According to the long-term demand/supply projections, the oversupply in the main cartonboard grades is expected to disappear after the mid-1980s. This will be primarily due to shut-downs of old, unprofitable machines in the EEC countries and the limited number of new projects.

Because of the slower growth of the paper market, future investment decisions will involve a greater risk. The relatively low profitability of the paper industry causes difficulties in arranging finance for new, large-scale projects. New projects are studied more carefully than before, and they have to go through the banking system. This will lead to better utilization of existing resources, which possibly means fewer new projects but more rebuilds and minor improvements.

The Scandinavian producers, and Iggesund as a leader in this field, will remain the main suppliers of high quality boards in Western Europe in the 1980s. They have good fiber raw material available and the know-how needed in developing, manufacturing and marketing these demanding products. ☐

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